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THE PREVALENCE OF INFLUENZA

Only 4,655 cases of influenza were reported to the Public Health Service by State health officers for the week ended March 21, 1931. This is the smallest number reported for any week since January 17. The disease this year has been characterized by somewhat irregular progress from east to west, short duration in most localities, few complications, and a low death rate as compared with epidemic years since 1917.

Reports from Great Britain and European countries show a general decrease in the prevalence of influenza, although the latest available information includes reports of increases in some localities.

SICKNESS AMONG INDUSTRIAL EMPLOYEES IN THE SECOND HALF OF 1930¹

A favorable health record among industrial workers during the second half of 1930 is indicated from reports of a group of industrial sick-benefit associations covering about 135,000 male industrial employees. The record is based on the frequency of claims for sickness and nonindustrial accident benefits covering cases causing disability for 8 consecutive calendar days or longer. A low rate of cases causing more than one week's disability was recorded also for male employees of the same industrial establishments in the first and second quarters of 1930.²

Although available morbidity rates are based on sample data that may be too small to be representative, favorable mortality rates in 1930 suggest that the relatively low incidence rates of disabling sickness among the men included in the record under discussion may have prevailed generally. The death rate among about 19 million industrial policyholders of the Metropolitan Life Insurance Co. is reported as being about 1 per cent less than in 1927, when the previous minimum death rate was established.³ Among the sixty-odd thousand members of the Relief Plan of the Bethlehem Steel Corporation, both mortality and morbidity in 1930 were substantially below the

¹ From the Office of Industrial Hygiene and Sanitation, U. S. Public Health Service.

² Cf. Sickness among industrial employees in the first half of 1930, Public Health Reports, Vol. 45, No. 43, October 24, 1930. (Reprint No. 1420.)

³ Statistical Bulletin, Metropolitan Life Insurance Co., Vol. 12, No. 1, January, 1931, p. 1.

average during prior years.⁴ The data available seem to indicate that the year as a whole was marked by relatively good health among the wage-earning population of the United States.

That the favorable sickness record was due largely to the absence of serious epidemics of a respiratory nature is indicated by the non-respiratory disease rate, which differed little in 1930 from that of 1929 and 1928. In contrast, the incidence of influenza or grippe was much lower in three of the four quarters of 1930 than in the corresponding periods of the two immediately preceding years. The frequency of cases of pneumonia also was relatively low throughout the year 1930. The death rate from influenza among industrial policyholders of the Metropolitan Life Insurance Co. was lower in 1930 than for any other year, with a single exception, since the great pandemic of 1918-19. The mortality rate for influenza and pneumonia combined was the smallest ever experienced among these millions of insured persons, as was the 1930 rate for pneumonia separately.⁵ It will be recalled that the recent mild wave of influenza did not get under way until January, 1931.

An unusually low rate was established not only for influenza and pneumonia, especially in the second half of 1930, but also for other diseases of the respiratory system. The rates for bronchitis (acute and chronic) and for pharyngitis, tonsillitis, and other diseases of the pharynx were unusually low as may be seen from the comparisons afforded in Table 1. The diseases included in the category "other respiratory diseases" were also conspicuous by their infrequency. The low rate of new cases of tuberculosis of the respiratory system shown in the fourth quarter of 1930 may be revised upward if later reports change to a diagnosis of tuberculosis certain cases which at present are classified among the less serious respiratory diseases. There is little likelihood, however, that the indicated rate of new cases of tuberculosis in the third quarter of 1930 will be appreciably altered. In general, it may be said that all of the numerically important respiratory diseases appear to have occurred at below-average incidence in this industrial group during the last six months of 1930.

In spite of unusually hot weather in the third quarter of 1930 (July, August, September), the frequency of 8-day and longer cases of diseases of the stomach, diarrhea, and enteritis was not abnormally high. The only nonrespiratory disease group shown in Table 1 which exhibited signs of increased prevalence in the summer of 1930 was the epidemic and endemic disease group, exclusive of influenza. This group covers titles numbered 1 to 10 and 12 to 25 in the International List of the Causes of Death, 1920 revision.

As has been indicated, the morbidity rates presented in Table 1 cover a very small sample of the wage-earning population of the

⁴ Fifth Annual Report of Relief Plan of Bethlehem Steel Corporation and Subsidiary Companies, p. 8.

⁵ Statistical Bulletin, Metropolitan Life Insurance Co., Vol. 12, No. 1, January, 1931, p. 4.

country. However, comparisons of recent with earlier periods were made among men in the same industrial establishments, so that the same population, as near as it was possible to obtain, was under observation.

The establishments included were (with one exception) located north of the Ohio and Potomac Rivers and east of the Mississippi. The sickness rates for female employees are not presented on account of paucity of data.

TABLE 1.—*Frequency of disability lasting 8 calendar days or longer in the third and fourth quarters of 1930 compared with the corresponding quarters of 1929 and 1928—Male morbidity experience of 17 industrial establishments which reported their cases to the United States Public Health Service during all three years*¹

Diseases Causing Disability (Numbers in parentheses are disease title numbers from the International List of Causes of Death, 3d revision, Paris, 1920)	Annual number of disabilities per 1,000 men in—		
	1930	1929	1928
THIRD QUARTER (JULY, AUGUST, SEPTEMBER)			
Sickness and nonindustrial injuries.....	78.2	88.2	84.1
Nonindustrial injuries.....	12.5	13.3	11.1
Sickness.....	65.7	74.9	73.0
Respiratory diseases.....	17.2	23.3	25.0
Influenza and gripe (11).....	4.2	6.8	9.1
Bronchitis, acute and chronic (90).....	2.9	3.4	3.8
Pneumonia, all forms (100, 101).....	1.2	1.5	1.2
Diseases of the pharynx and tonsils (169).....	4.5	5.8	5.1
Tuberculosis of the respiratory system (31).....	.9	1.1	.9
Other respiratory diseases (97, 98, 102-107).....	3.5	4.7	4.9
Nonrespiratory diseases.....	48.5	51.6	48.0
Diseases of the stomach, diarrhea, and enteritis (111,112, 114).....	6.8	6.9	5.7
Other diseases of the digestive system (108, 110, 115-127).....	8.2	10.1	8.9
Diseases of the circulatory and genito-urinary systems and annexa (87-96, 128-136).....	7.1	8.2	6.5
Diseases of the nervous system (70-84).....	5.0	5.0	4.7
Diseases of the skin (151-154).....	4.6	4.8	5.4
Epidemic and endemic diseases except influenza (1-10, 12-25).....	1.4	1.2	.9
Rheumatism—acute and chronic (51, 52).....	4.5	4.4	6.0
Lumbago and other diseases of the organs of locomotion (158).....	3.5	3.7	3.4
Ill-defined and unknown causes (205).....	2.3	2.0	1.8
All other diseases (26-30, 32-37, 41-50, 53-69, 85, 86, 155-157, 159, 164).....	5.1	5.3	4.7
Average number of males covered in the records.....	137,730	143,344	110,985
FOURTH QUARTER (OCTOBER, NOVEMBER, DECEMBER)			
Sickness and nonindustrial injuries.....	84.5	96.0	130.0
Nonindustrial injuries.....	12.2	12.7	11.4
Sickness.....	72.3	83.3	118.6
Respiratory diseases.....	26.0	37.4	69.2
Influenza and gripe (11).....	10.7	15.1	45.4
Bronchitis, acute and chronic (90).....	4.2	6.5	6.7
Pneumonia, all forms (100,101).....	2.0	2.9	3.9
Diseases of the pharynx and tonsils (109).....	4.1	6.9	5.9
Tuberculosis of the respiratory system (31).....	.7	1.0	.9
Other respiratory diseases (97, 98, 102-107).....	4.3	5.0	6.4
Nonrespiratory diseases.....	46.3	45.9	49.4
Diseases of the stomach, diarrhea, and enteritis (111,112,114).....	5.5	5.0	6.1
Other diseases of the digestive system (108, 110, 115-127).....	8.1	7.3	7.2
Diseases of the circulatory and genito-urinary systems and annexa (87-96, 128-136).....	7.8	7.3	8.0
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Ill-defined and unknown causes (205).....	1.6	1.7	2.0
All other diseases (26-30, 32-37, 41-50, 53-69, 85, 86, 155-157, 159, 164).....	5.0	4.6	4.9
Average number of males covered in the records.....	131,673	140,007	110,452

¹ Except that the rate for 1928 covers 16 of the 17 establishments included in 1929 and 1930.

COURT DECISION RELATING TO PUBLIC HEALTH

Injunction to restrain operation of municipal sewage disposal plant denied.—(Texas Commission of Appeals; city of Wylie et al. v. Stone, 34 S. W. (2d) 842; decided Feb. 4, 1931.) The plaintiff in the trial court was the owner of a tract of land which was located near the city of Wylie and which was used by the plaintiff as a homestead for himself and family. Adjacent to this land was a tract owned by the city of Wylie and on which was maintained a municipal sewage disposal plant. On the ground that such disposal plant constituted a nuisance which interfered with the use and comfortable enjoyment of his premises, the plaintiff brought suit solely to restrain the city from the further operation of the plant at the place where it was located. The jury found that the operation of the plant constituted a nuisance which diminished the value of plaintiff's premises to the extent of \$5,000, that the removal of the plant by the city would entail a loss upon it of \$8,000, and that there was another more suitable location for such a plant where injuries similar to those suffered by the plaintiff would not be inflicted upon others. Upon these findings the trial court decreed that the disposal plant be abated as a nuisance, and the city was restrained from using or operating the same at the place where located after six months from the date of final judgment. The court of civil appeals reversed the judgment of the trial court, and the plaintiff took the case to the commission of appeals.

By article 1109b of the Revised Statutes, 1925, cities and towns of less than 5,000 inhabitants were given the power to "appropriate private property for public purposes whenever the governing authorities shall deem it necessary and to take any private property within or without the city limits for any of the following purposes, to wit: * * * sewer systems, storm sewers, sewage disposal plants, drains, filtering beds and emptying grounds for sewer systems." The city challenged the power of the trial court to substitute its judgment as to a proper location for a disposal plant for that of the city's governing body, in the absence of pleading and proof that the city officials in locating the plant acted arbitrarily or capriciously. The commission of appeals held that the above-quoted statute vested a discretionary power in the governing body of the city as to the location of the disposal plant, and that, such being the case, the courts were not authorized to interfere with the exercise of the discretion thus granted in the absence of pleading and proof, which was wanting in the instant case, that the action of the city officials in selecting the particular location was not the exercise of a fair discretion but was the result of an arbitrary or capricious choice upon their part.

The commission of appeals also held that article 1108 of the Revised Statutes, 1925, which authorized a city to purchase and own lands

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for the purpose of operating a sewerage system, should be construed in connection with article 1109b, as both related to the same subject matter. The commission stated that "the authorization in article 1109b to 'take any private property' when 'the governing authorities shall deem it necessary' should be construed to include that taken either by purchase or through condemnation proceedings. * * * No sound reason can be advanced as to why the legislature would vest a discretion in the city authorities as to the location of a sewerage plant where land was acquired by condemnation and deny such privilege where litigation had been avoided by acquiring the land by private purchase."

The judgment of the court of civil appeals was affirmed.

PRELIMINARY REPORT OF COMMITTEE ON MILK PRODUCTION AND CONTROL

White House Conference on Child Health and Protection

SECTION II: PUBLIC HEALTH SERVICE AND ADMINISTRATION

Surg. Gen. HUGH S. CUMMING, *Chairman*

Subsection C: Committee on Milk Production and Control

H. A. WHITTAKER, *Chairman*

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Lucius P. Brown, proprietor, Ewell Farm, Spring Hill, Tenn.

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Frank C. Wilson, director, dairy products laboratory, State board of health, Indianapolis, Ind.

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I. Communicable diseases:

- S. J. Crumbine, M. D., *chairman.*
- V. A. Moore, D. V. M., M. D.
- Lucius P. Brown.

II. Public health supervision:

- Leslie C. Frank, *chairman.*
- Charles O. H. Laughinghouse, M. D.¹
- Frank C. Wilson.

III. Nutritional aspects:

- E. V. McCollum, D. Sc., Ph. D., *chairman.*
- F. W. Schultz, M. D.
- James A. Tobey, D. P. H.

IV. Economic aspects:

- O. E. Reed, *chairman.*
- C. E. Gray.
- Frederic W. Howe.

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PRELIMINARY REPORT

Your committee has directed its efforts toward collecting information on milk that would be of value to the conference in promoting and protecting the health and welfare of the child.

The different phases of milk selected for study were (1) its relation to communicable diseases, (2) its public-health supervision, (3) its nutritional aspect, and (4) its economic aspect. The committee, in order to facilitate its work, was divided into four subcommittees, each of which has considered one of these phases of the subject.

The subcommittee on communicable diseases transmitted through milk collected information on the human and bovine diseases that may be or are milk-borne, the epidemiological evidence of each disease, and the number of recorded outbreaks of disease traced to milk or milk products during the past six years.

The subcommittee on the public-health supervision of milk, obtained information on the essential elements of milk supervision, the legal aspect of its supervision, the measurement of the results of milk supervision effort, and the present status of milk supervision in this country.

The subcommittee on the nutritional aspects of milk considered the nutritive properties of cow's milk and milk products and the nutritive properties of human milk.

The subcommittee on the economic aspects of milk obtained information on the consumption of fluid milk and other milk products, the production, marketing, transportation, processing, and delivery of milk, and the economic importance of the sanitary quality of milk and cream.

For the purposes of this report, each subcommittee has presented a brief statement containing the conclusions it has drawn from its studies and its recommendations based thereon. The individual subcommittee reports follow.

Report of Subcommittee on Communicable Diseases Transmitted Through Milk

The newest and freshest food that we consume in some form every day is at the same time the oldest-known food of which there is an accurate historical record.

Archæologists have recently discovered on the façade of the temple at Ur a milking scene; thus as long ago as 4000 B. C. milk was an important source of food in that ancient civilization of the Chaldees.

The Bible has many references to milk.

The wise King Solomon admonished his people "to have goat's milk for the food of thy household and for the maintenance of thy maidens." No wonder he is represented to be the wisest man in the world!

All down the ages history records the use and importance of milk as a food. Even the legendary tales of ancient Rome recite the most astonishing and magical event of the twin boys, Remus and Romulus, afterwards the founders and heroes of Rome, who, as children, were abandoned in a cave to perish, but who were miraculously nurtured by a "she" wolf with her milk until they were found and rescued.

These actual and legendary records but emphasize the fact of the important place as a food that milk held during all the ages of recorded history.

Babies who were denied mother's milk have been dependent for their nourishment and, indeed, their life, upon milk from some one of our domestic animals, usually the cow, goat, ass, or camel.

The production of an abundant, safe, and wholesome milk supply has been attended with great difficulties and its success or failure has in a large measure conditioned the life hazard of babies who could not be breast fed, as revealed in the infant mortality tables of the various countries of the world, particularly mortality due to the diarrheal diseases. Not only is the life hazard of bottle-fed babies most favorably influenced by a pure and wholesome milk supply, but the average level of robust health of infant, child, and adult as expressed in normal nutrition and vigorous resistance to disease is enormously increased and promoted, for milk and milk products have become one of our most important and indispensable foods in the daily dietary of America.

The tremendous increase in production and consumption of milk and milk products has brought with it problems relating to its safety and wholesomeness.

The recurring milk-borne epidemics, with their annual total of sickness, deaths, and economic loss should be considered in the light of impressive evidence that milk control officials, milk distributors, and dairymen have a tremendous responsibility in securing for the consuming public a clean and safe milk. The evidence that this responsibility has not yet been fully met is presented in the following table of milk-borne epidemics occurring in the United States during the past six years.

TABLE I.—Number of milk-borne epidemics in the United States—Cases and deaths by disease and year during the six years 1924-1929

[Reported by State health officer]

Number of milk-bottle accidents cases and deaths

A review of the milk-borne epidemics for 1929, compared with the 5-year period 1924-1928, is not very reassuring from the standpoint of reduction of epidemics and in cases of illness therefrom with their attendant deaths.

Table 2 reveals the situation as reported by the several State health officers of the United States:

TABLE 2.—*Milk-borne epidemics in the United States in 1929—cases and deaths by disease—as compared with those of the preceding 5-year period*

[Reported by State health officers]

Disease	Number of States report- ing	Milk-borne epidemics, cases and deaths											
		1929				5-year period, 1924 to 1928							
		Epidemics		Cases		Deaths		Epidemics		Cases		Deaths	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
All diseases	44			1,959		48		214		8,947		323	
Diphtheria	0	0						8	3.73	208	2.32	1	0.30
Dysentery	1	1	2.27	8	0.41	0	0						
Gastroenteritis	0	0						4	1.86	391	4.37	0	0
Paratyphoid	1	1	2.27	38	1.93	1	2	2	.93	55	.61	0	0
Poliomyelitis	0	0						1	.46	11	.12	2	* .61
Scarlet fever	5	9	20.45	722	36.85	1	2	25	11.63	1,252	14.00	9	2.78
Septic sore throat	5	7	15.90	739	37.72	13	27.08	15	7.00	3,422	38.24	63	19.50
Typhoid fever	18	25	56.81	450	22.97	33	68.74	152	71.02	3,569	39.89	248	76.78
Undulant fever	1	1	2.27	2	.10	0	0	7	3.27	39	.43	0	0

Table 3 sets forth the sources of milk infection as disclosed by the reports from the State departments of health. Of the 44 epidemics, 13 were traced to chronic carriers of disease; 18 to sick persons continuing to work in the dairy (so-called ambulatory cases); 5 epidemics were reported to be due to contaminated and unsterilized bottles which were returned from homes where sickness prevailed; 4 were said to be due to the polluted water supply; and 1 is attributed to diseased dairy cows. "Carriers" and "cases on dairies," the two most frequent sources of milk infections, combined caused 31 epidemics, or 76 per cent of the total, involving 1,836, or 90 per cent, of the cases and 23, or 51 per cent, of the deaths.

TABLE 3.—*Sources of milk infection in the United States by diseases—Milk-borne epidemics in 1929—Cases and deaths*
[Reported by State health officers]

In the fall of 1923 the American Child Health Association, in co-operation with the Conference of State and Provincial Health Authorities and the Association of Dairy, Food, and Drug Officials, inaugurated what was announced at the time as "A nation-wide movement to secure for every baby, child, and adult in America a clean and safe milk supply." This cooperative work has been carried on continuously since its inauguration. Up to 1930, 29 States and one Province of Canada have been surveyed as to the conditions of milk production and distribution in fairly representative sections of the States. The results of these surveys show that the milk supply in the smaller cities and country towns is not generally produced and distributed under such sanitary conditions and safeguards as to insure a safe supply of milk to the ultimate consumer. In these smaller communities a very small percentage of the milk is pasteurized;

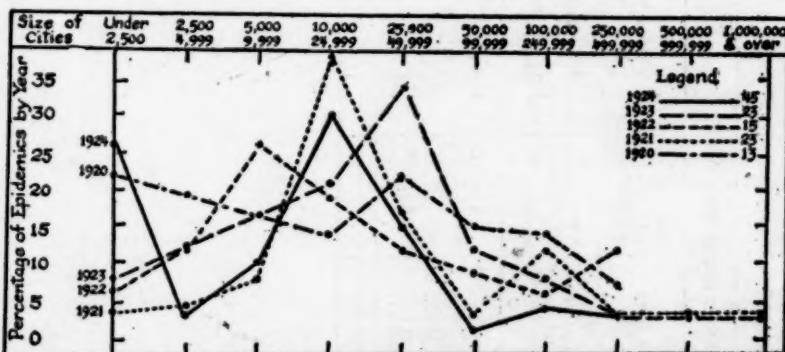


CHART 1.—Milk-borne epidemics in the United States, 1920-1924, reported by State health officers. Of the 119 epidemics recorded on the chart, the major percentage distribution of them occurred in cities of from 10,000 to 25,000 population and in smaller communities, including the rural sections and towns under 2,500 population.

thus the continuing annual epidemics of milk-borne diseases need not be a matter of surprise, although it is a matter of great concern from the standpoint of public health. This point of view is supported by the epidemiological evidence shown in Charts 1 and 2.

The probable reason for the higher incidence of milk-borne epidemics in the small country towns and rural sections, and the cities of from 5,000 to 25,000 is that in such communities we find the largest population groups being served almost wholly by raw milk; that is, milk not produced under effective or, in the majority of instances, any source of continuing control. From these studies one may fairly conclude that in the average American city of from 5,000 to 25,000 population, and in the small towns and rural communities one may expect to encounter the greatest health hazard in relation to the consumption of unpasteurized milk.

If we may use milk-supply control as an indication of sanitary development, health department practice in the small town is still

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in its infancy. This milk supply is little better in sanitary quality than it would have been if approved processes of pasteurization had never been discovered. The large cities have long recognized the

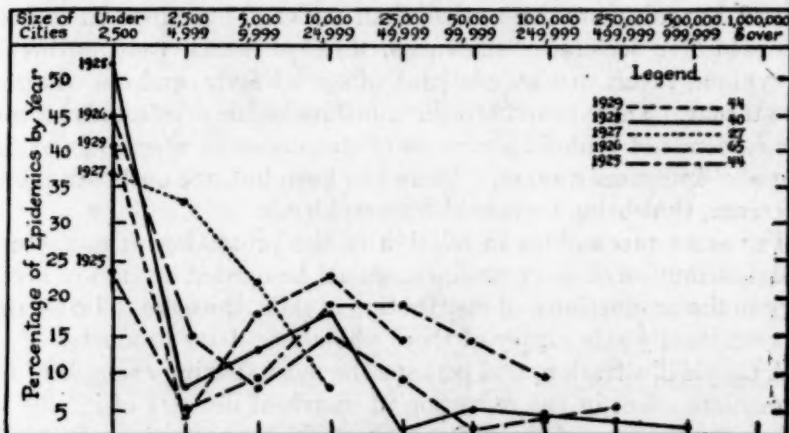


CHART 2.—Milk-borne epidemics in the United States, 1925-1929, reported by State health officers. Epidemics occurring in cities during the period 1925-1929 have somewhat the same distribution as those of the period 1920-1924, although in the later period the larger percentage of milk-borne diseases occurred in the rural districts and in towns under 2,500 population.

protection afforded by pasteurization, and thus, so far as milk-borne diseases are concerned, are reasonably well protected. The problem of the small town and city is to awaken its citizens to the need for clean milk, rendered safe by pasteurization. When we remember

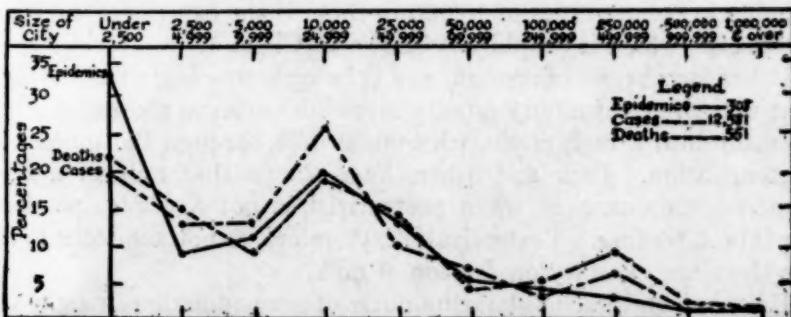


CHART 3.—Milk-borne epidemics in the United States, 1920-1929, reported by State health officers (1920 populations). The percentage distribution of milk-borne epidemics during the decade 1920-1929, as expressed in cases and deaths distributed by population of communities affected, shows the same general trend—the higher percentages occurring in cities of between 5,000 and 25,000 population and in towns under 2,500 population, including rural communities.

that approximately 50 per cent of our population resides in the small towns and rural communities, and thus in the main are without the protection that pasteurized milk affords, the importance of this type of public health problem is self-evident.

It seems reasonable to conclude that until the time when we have efficient pasteurization of milk, frequent outbreaks of milk-borne epidemics may be expected.

A search of literature reveals an occasional epidemic of disease caused by dairy products other than milk. Thus there have been recorded five ice-cream epidemics, three of which were outbreaks of typhoid fever, one an outbreak of scarlet fever, and one of septic sore throat. There have been three outbreaks due to infected cheese—one epidemic of typhoid fever, one of streptococcal infection, and one of gastro-intestinal disease. There has been but one outbreak traced to cream, that being a typhoid-fever epidemic.

The same precautions in relation to the protection, manufacture, and distribution of dairy products should be carried out as are necessary in the production and distribution of milk, if we are to be assured of a constantly safe supply of these wholesome dairy products.

A classic illustration, and perhaps the most striking example of the immediate effect in the reduction of diarrheal diseases of infants by the pasteurization of the milk, is that which occurred on Randall's Island, N. Y., in a children's institution, where a mortality of 44.36 was promptly reduced to 19.80 after all the milk was pasteurized, no other hygienic measures being put into operation.

That effective milk supervision and control does greatly reduce that portion of infant mortality due to diarrhea and enteritis is shown by experience in a number of American cities. An excellent example of the apparent correlation between the reduction of fatalities from diarrhea and enteritis and the increase of pasteurization of milk supplies in communities of 10,000 or more is the experience in Massachusetts, which is graphically shown in Chart 4.

It has long been understood, and is being increasingly emphasized, that milk of an insanitary quality or a high bacterial content can not be made into a high grade, wholesome milk through the process of pasteurization. Park and others have shown that milk of a high bacterial content, even when pasteurized, is not a wholesome food for infant feeding. Pasteurization, therefore, is not a substitute for the clean and sanitary production of milk.

However, inasmuch as large numbers of our population living in the smaller cities, towns, and rural communities can not, under present conditions, avail themselves of a wholesome pasteurized milk supply, it becomes all the more necessary that effective sanitary control be instituted in these communities for the production and distribution of a clean and safe milk supply. Perhaps the most promising movement in this direction is the growing demand for the installation and maintenance of full-time county or district health units, through which means a constant and continuing supervision of milk supplies

may be secured. In the absence of local health supervision, the State must assume the responsibility of local milk control.

In some communities milk producers and distributors, recognizing the importance of clean and safe milk, have joined with sympathetic and helpful officials in cooperative effort in the providing of a clean and wholesome supply. Such efforts are commendable and should be fostered wherever possible. The milk-control work in California is an excellent example of such effective teamwork, which has resulted in increased consumption and increased profits for the producers.

Fortunately, purity and cleanliness of milk are the chief requisites in flavor and general wholesomeness, so that the real interests of both milk producers and distributors and the public control officials run

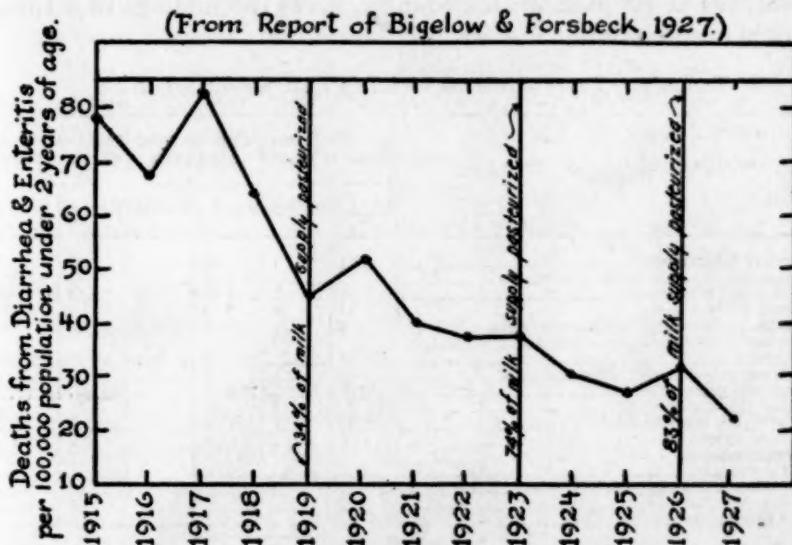


CHART 4.—Correlation between deaths from diarrhea and enteritis and the pasteurization of milk supplies in communities of 10,000 or more population in Massachusetts

parallel and thus afford a common ground upon which effective milk control may be instituted.

The spread of human diseases through the medium of milk is of much greater epidemiological significance than the direct transmission of infections from cattle, and their prevention calls for certain precautions other than those here suggested.

Tuberculosis.—In 1898, Theobold Smith published the results of his extensive studies on tubercle bacilli from different sources—7 from human sputum, 5 from cattle, and 1 each from a cat, horse, and pig. His conclusions were that there exist "a distinctively human, or sputum, and a bovine variety of tubercle bacilli". He describes with great clearness the differences that exist between these two types, in

their morphology, cultural characters, and virulence, especially for rabbits and calves.

With the difference between the two types of tubercle bacilli clearly defined, it was possible to determine with reasonable certainty whether the bacilli in a tuberculous tissue belonged to the human or to the bovine strain. Extensive researches on the types of tubercle bacilli were undertaken especially in the Gesundheitsamt in Berlin, by the British Commission on Tuberculosis, human and bovine, and in the research laboratory of the New York City Board of Health. In addition to these major investigations many specimens have been studied by different workers. The appended table, compiled by Park and Krumwidie from data obtained at the time bovine tuberculosis was at its peak in this country, gives the findings in a total of 1,220 examinations.

TABLE 4.—*Types of tubercle bacilli in 1,220 human infections*

Diagnosis	Adults of more than 16 years		Children from 5 to 6 years		Children younger than 5 years	
	Human	Bovine	Human	Bovine	Human	Bovine
Pulmonary tuberculosis.....	644	1	11	—	23	1
Glandular tuberculosis (axillary or inguinal).....	2	—	4	—	2	—
Cervical gland tuberculosis.....	27	1	38	21	15	21
Abdominal tuberculosis.....	14	4	8	7	9	13
Generalized tuberculosis (alimentary origin).....	6	1	2	3	13	12
Generalized tuberculosis (with meningitis, alimentary origin).....	29	—	5	1	46	13
Generalized tuberculosis (with meningitis).....	5	—	7	—	52	1
Tuberculous meningitis.....	1	—	3	—	27	4
Bone and joint tuberculosis.....	27	1	38	3	26	—
Genito-urinary tuberculosis.....	17	1	2	—	—	—
Cutaneous tuberculosis.....	3	—	1	—	1	—
Other tuberculoses:						
Of the tonsils.....					1	—
Of the mouth and glands of the neck.....		1	—	—	—	—
Of the maxillary sinus.....	2	—	—	—	1	—
Latent tuberculosis.....	—	—	—	—	—	—
Total.....	777	10	117	36	215	65

The commissions and laboratory mentioned report a total of 121 cases of tuberculous meningitis that have been studied. Twenty-one were in persons from 5 to 16 years of age, from which the human type was isolated in 19 cases and the bovine in 2. The remaining 100 were in children under 5 years of age, of which 80 contained the human and 20 the bovine bacillus.

Cobbett collected the reports of the examinations of 57 cases of abdominal tuberculosis, of which 10 were in adults. In 8 adult cases the human type was recovered, and both forms were present in 2. In the 47 cases under 16 years of age, 19 were due apparently to the human type and 28 to the bovine.

The examination of 49 cervical glands that had been removed surgically from adults showed that 40 contained the human and 9 the bovine organism. The study of 115 such cases in children between

the ages of 5 and 16, showed 52 to contain the human and 63 the bovine, and in 83 cases in children under 5 years of age 17 showed the human and 68 the bovine type.

According to Cobbett the prevalence of the bovine type in cervical glands that had been removed surgically from persons 16 years of age and younger varied considerably in different countries. In Scotland it was 87 per cent, in the United States 53 per cent, in England 50 per cent, and in Germany 35 per cent.

The probable source of infection is through raw milk from cows affected with tuberculous udders. Smith concluded that "bovine tuberculosis may be transmitted to children when the body is over-powered by large numbers of bacilli, as in udder tuberculosis or when certain unknown favorable conditions exist."

In the United States, the control of bovine tuberculosis is solving the problem of human infection with the bovine strains. In 1917 the Federal Government, in cooperation with the States, undertook to eradicate bovine tuberculosis by the accredited herd plan. Already large areas have been freed from this disease. There are 976 modified accredited counties in the United States. There are 2,435,000 herds that contain 20,983,000 animals that are once-tested-free. There are over 27,000,000 cattle now under official supervision and the work is progressing rapidly. In the month of June, 1930, there were 986,607 cattle tested. Nowhere have veterinarians undertaken a more comprehensive sanitary problem than in the elimination of tuberculosis from the cattle of this country. While this is being done, health officials are insisting on pasteurization which destroys tubercle bacilli, if they are present in the milk.

Undulant fever.—In recent years undulant fever has been recognized as one of the diseases of cattle communicable to man through milk.

Undulant fever is caused by *Brucella abortus* [*Brucella melitensis*], which is responsible for infectious abortion in cattle and swine. Bang and Stribolt, of Copenhagen, described this organism in 1897, but its infectiousness for man was not recognized until recently. Like tuberculosis, the specific organisms of infectious abortion found in different species have been differentiated into three distinct races or species, namely: *Brucella melitensis* [*Brucella melitensis* var. *melitensis*], the cause of Malta fever in man; *Brucella abortus* [*Brucella melitensis* var. *abortus*], the cause of infectious abortion in cattle, and which produces a disease in susceptible people similar to Malta fever; and *Brucella suis* [*Brucella melitensis* var. *suis*], the strain that has been isolated from swine.

The first case of human infection with *Brucella abortus* reported in America was described by Keofer in 1924. In 1926, Carpenter and Merriam reported two cases in Ithaca. The same year Moore and

Carpenter called attention to four others. By aid of the Hecksher Fund, Carpenter, Parshall, and Baker were able to study this disease and to test the pathogenesis of the specific organisms isolated from man on guinea pigs and pregnant heifers. They reported 18 cases in man. In addition they found *Brucella abortus* in 8 of 55 pairs of tonsils examined that had been removed by local surgeons.

The results of studies made at the New York State Veterinary College showed that in a period of two years 26 cases of undulant fever had been recognized in a population of 337,000, in a highly developed dairy district. There were no fatalities and but very few of the cases were seriously ill. All of them were in people who stated that they drank freely of raw milk. None of them were butchers or engaged in handling meat or in raising swine. In a number of instances the milk came from herds where Bang abortion disease was found to be prevalent. In one instance the "family cow" was the only one in the herd whose milk was infectious. An examination of the samples of market milk showed that approximately 20 per cent of the raw market milk sold in this territory contained *Brucella abortus* in sufficient numbers to produce lesions in guinea pigs. It was found also that from 20 to 35 per cent of the dairy cows that gave a positive agglutination test were eliminating the organism in their milk. However, of the cows that had actually aborted, 40 to 50 per cent harbored *Brucella abortus* in their udders.

Hardy collected the cases of undulant fever that had been reported in the United States up to July, 1929. He found a total of 1,296 cases distributed in 43 States. Of these less than 3 per cent were in children under 10 years of age. He did not include those cases reported from Texas, Arizona, and New Mexico, which are likely to be of goat origin. He records 223 cases from Iowa, of which 116, or 52.3 per cent, were in country people and 23, or 10.4 per cent, were in urban residents employed in packing houses. There were 30 cases, or 13.4 per cent, who lived in cities but who were not engaged in handling animals or meat, and 53, or 23.9 per cent, who lived in towns of less than 5,000 population.

There is a voluminous literature, including reports of cases, setting forth the supposed source of infection of this newly recognized disease in man. Undoubtedly there are many cases not reported, and it is possible that young children may be affected more often than it is now supposed. However, the data available suggest that undulant fever is not of so great an epidemiological significance as certain writers have implied. Smith has pointed out that the bovine type of *Brucella abortus* is so slightly invasive for man that it fails to produce appreciable disturbances, but that as a by-effect it may immunize toward the more virulent types of bovine and caprine origin. He also shows that the porcine type may become seeded in the udder

of the cow, just as hemolytic and scarlatinal streptococci, under certain unknown conditions, may gain a foothold in it, from which they are ingested with the milk.

The practical question with which this conference is concerned is, how can human infection from the strain or strains of *Brucella* that come to man through milk be prevented? Undoubtedly infections occur through the handling or working with infected animals and animal tissues, but these are separate from milk-borne infections. It is significant to note that the majority of cases recorded were in country people where pasteurization of milk is rare, or in those who lived in cities but were employed in packing houses.

Fortunately, the control of the milk-borne cases of undulant fever is not difficult. It involves the proper pasteurization of all market milk and that consumed on the farms, until the time when dairymen have eradicated Bang abortion disease from their animals. Well formulated and workable plans are advocated by competent veterinarians and also by a few State livestock sanitary boards to aid cattle owners in their efforts to eliminate this infection from their herds. "Sound animals only" is rapidly becoming the slogan of milk producers.

Septic sore throat.—In 1875 septic sore throat due to infected milk was recognized in South Kensington, England. In May, 1911, an outbreak occurred in Boston, Mass. Winslow made a careful epidemiological study of the 1,400 cases involved and found that 70 per cent were supplied with milk from one dairy. Smith isolated a streptococcus from the tissues of four fatal cases. The relation of streptococci to udder infection was suspected as early as 1884 by Nocard and Mollereau. The epidemics of septic sore throat traced to milk infection that have been reported since 1910 are numerous and the total number of cases extends into the thousands with many deaths. The one in Chicago in 1911 reported by Capp and Miller is estimated to have numbered 10,000 cases and the one in Lee, Mass., in 1928, involved 1,000 cases with 40 deaths. The United States Public Health Service reports from 1918 to 1926, inclusive, 16 epidemics with 3,179 cases and 34 fatalities. In 1929 there were reported in the United States 7 epidemics with 739 cases and 13 deaths, and in Canada 4 epidemics with 37 cases and 3 deaths. Measured by the number of fatalities, septic sore throat is the most serious of the milk-borne diseases traced to udder infection. However, it occurs among adults more than in young children. In the Lee epidemic only 20 per cent of the cases were in persons under 15 years of age.

Extensive studies have been made to differentiate the form of mastitis that is responsible for this affection. More recent studies have shown that the streptococci found in mastitis belong to at least

two distinct groups or species, namely, *Streptococcus epidemicus* that causes septic sore throat in man, and *Streptococcus mastiditis*, the cause of certain udder troubles. *Streptococcus epidemicus* is believed by many bacteriologists to be of human origin. The explanation is, that it finds its way into the milk ducts of the udder from infected persons, multiplies in the milk in the udder, and escapes with it. This streptococcus may be present in large numbers before lesions in the udder appear and before there are symptoms to arouse suspicion on the part of the milker.

The control of this form of septic sore throat rests in efficient pasteurization, since the streptococcus causing it may not produce tissue changes in the udder of the infected cow and can not always be excluded by physical examination.

Scarlet fever.—While the causative agent in milk-borne scarlet fever is considered generally as coming from a case of human infection, transported in milk, there is evidence that *Streptococcus scarletinæ* may become located in the udders of cows where it multiplies and causes a definite mastitis. In such cases the diseased udder becomes a source of supply for the distribution of the specific streptococcus. Jones and Little were the first to furnish bacteriological evidence that cows could be infected with the scarlet fever organism. They reported a case where the milk of an infected udder contained 345,000,000 streptococci per cubic centimeter. The streptococcus answered all the requirements for that of scarlet fever.

Jones has pointed out that milk, under ordinary conditions, inhibits the growth of scarlet fever streptococci and that the usual opinion that milk-borne epidemics of this disease are due to a human case or carrier on the farm, or in the dairy, may be erroneous, as the cause may have its immediate origin in an infected udder. The present knowledge indicates that dairy cattle should be protected against infection from human carriers. In addition, the milk should be pasteurized.

Mastitis.—In recent years a number of outbreaks of illness, largely among children, and usually of short duration, have been reported following the consumption of milk from cows suffering with mastitis and from which streptococci were isolated. The reports by Massey in the London Lancet and by Laidlaw in a New York State journal of medicine, suggest that streptococci in cases of mastitis may be injurious. Acting on this supposition, veterinary inspection of dairies is being increased and more attention is being given to pasteurization.

Miscellaneous disturbances.—A disease of cattle known as "trembles" has been reported from certain restricted areas in the United States. The milk of affected cows transmits the disease to man.

In case of catarrhal and parenchymatous mastitis, the pus present in the milk may be harmful, especially to young children. In cases of disease in which cows have a high temperature, the milk may cause unpleasant symptoms. Milk from cows suffering from indigestion may possess properties of an irritating nature.

The greatest factor in the protection of milk against contamination of all kinds is the human equation. Knowledge and regulations are too often neglected both by milk producers and by consumers. Milk to remain wholesome must be cared for properly after it leaves the udder. This involves an intelligent understanding of its nature and how to protect it. Improvement depends on the application of sanitary principles. The course for obtaining an almost perfect milk supply in this country is blazed unmistakably and in the main the people are following the trail.

From the data gathered from a large number of reports and results of special researches on the transmission of disease from cattle to man through milk, the intensive work of the Federal and State Governments to eradicate bovine tuberculosis in this country, the active interest that is being taken by many dairymen and a few States to eliminate Bang abortion disease, the thorough physical examination of dairy cows by competent veterinarians and the exclusion of diseased individuals required by the large milk companies and many municipalities, and the demands of health officials in all large and most smaller cities that, *in addition to the precautions in its production, market milk should be pasteurized*, the following conclusion may be drawn: That the diseases mentioned in this report would, under solely natural conditions, become a serious menace to human health; but that the measures imposed by municipalities generally, and exacted by all responsible milk distributors to safeguard it against all possible contamination and infections, eliminate, for the greater part, the danger otherwise imminent, except for residents of rural districts and smaller towns where the preventive measures, especially pasteurization, are as yet not observed as fully as they are in the larger centers. The result of these united efforts is to give the American public a progressively cleaner and safer market milk.

RECOMMENDATIONS

- I. That pasteurization be required wherever practicable.
- II. That pasteurization is not intended to take the place of the sanitary production of clean and wholesome milk, but rather to provide the final factor of safety from milk-borne diseases.
- III. That cooperative effort between producers, control, and educational officials give promise of the best and most lasting results.

IV. That in the absence of local milk control the State must assume this responsibility.

Dr. S. J. CRUMBINE, *Chairman.*

Dr. V. A. MOORE.

LUCIUS P. BROWN.

Report of the Subcommittee on the Public Health Supervision of Milk

The subcommittee on the public health supervision of milk has attempted to formulate answers to the following questions:

- (1) What are the essential elements of the public health supervision of milk supplies?
- (2) What fundamental items should be included in the laws or regulations relating to the public health supervision of milk supplies, and what agencies should enforce them?
- (3) How should the results of the enforcement of the laws or regulations for the public health supervision of milk supplies be evaluated?
- (4) What is the present status of the public health supervision of milk supplies in the United States?
- (5) What recommendations should the White House Conference make with reference to the future improvement of the public health supervision of milk supplies in the United States?

WHAT ARE THE ESSENTIAL ELEMENTS OF THE PUBLIC HEALTH SUPERVISION OF MILK SUPPLIES

Since 40 or more milk-borne outbreaks of disease are reported annually in the United States with a resultant unnecessary toll of death and disease, all official public health agencies should be empowered to apply all essential public health measures for their prevention. These should include:

- (a) Inspection of farms and plants;
- (b) Supervision of the physical examination and testing of cows;
- (c) Laboratory examination of milk;
- (d) Physical examination of workers and residents at farms and plants, including laboratory examination of body discharges; and
- (e) Pasteurization control of general market milk.

(a) *Inspection* is designed to disclose whether the necessary public health precautions have been applied at the farm and plant, and therefore whether the degree of cleanliness and safety of the milk supply which these precautions provide has been assured. To be most effective inspections should be made at irregular but frequent intervals by competent inspectors.

However, sanitary inspection can not protect against infectious cows or infectious employees, nor can it insure the maintenance of proper methods between inspections. Therefore this milk control

measure can not alone be depended upon to insure a clean, safe milk supply.

(b) *Physical examination and testing of cows.*—Studies of the relation of bovine diseases to the public health have emphasized the importance of periodic physical examination and testing of cows for certain diseases transmissible by cows through milk to man. Much can be done by means of this measure to reduce disease transmission through milk, although the examinations and tests are not infallible and can not be made at sufficiently frequent intervals to insure the absence of infectious cows from the herds at all times.

(c) *Laboratory examination of milk.*—Laboratory examination of milk provides a valuable index with respect to cleanliness and safety and is deserving of both more intensive and more extensive use. Such examinations provide useful supplementary information. However, no known practicable laboratory examination of milk supplies will dependably disclose the existence of infectious cows, infectious employees, insanitary privies, unsafe water supplies, or fly contamination. Therefore, laboratory examination of milk should not alone be relied upon to insure a clean, safe milk supply.

(d) *Physical examination of workers and residents at farms and plants.*—Studies of the epidemiology of milk-borne outbreaks of disease have emphasized the importance of making periodic physical examinations of workers and residents at farms and plants, including laboratory examination of body discharges. Many epidemics of typhoid fever, for example, can be prevented by this measure. However, since such examinations are not infallible and can not be made at sufficiently frequent intervals to insure the absence of infectious persons from farms and plants at all times, this measure, while useful, should not alone be relied upon to prevent the transfer of infection from such persons to the milk.

(e) *Pasteurization control.*—Pasteurization, properly done, renders harmless or destroys all disease-producing organisms known to be transmitted through milk to man, and does not significantly impair or alter the flavor and food value of milk.

Because of the fact that the public health measures previously discussed are not of themselves completely protective, either singly or in combination, pasteurization control may be regarded as a necessary final public health safeguard for all general market milk supplies.

However, even pasteurization is subject to the fallibility of its operators; and while all health officers should persistently emphasize the fact that all milk may advantageously be pasteurized before it is consumed, either in a properly supervised commercial plant or at home, this measure should not be considered as rendering unnecessary any of the previously discussed measures. Pasteurization should go hand in hand with all other essential public health measures in order to insure a clean, safe milk supply.

WHAT FUNDAMENTAL ITEMS SHOULD BE INCLUDED IN THE LAWS AND REGULATIONS RELATING TO THE PUBLIC HEALTH SUPERVISION OF MILK SUPPLIES AND WHAT AGENCIES SHOULD ENFORCE THEM?

The first part of this question will be discussed under three subdivisions, namely, municipal, State, and federal legislation.

Municipal milk ordinances or regulations.—Municipal milk ordinances should be definite, clear, and brief. They should contain the following elements:

- (a) Definitions of milk, milk products, and other terms used in the ordinance or regulation;
- (b) Prohibition of the sale of adulterated milk and milk products;
- (c) Provision for permits, and for permit revocation;
- (d) Requirements governing the labeling of containers;
- (e) Requirements relating to the frequency of inspection and re-inspection, and the posting of inspection reports;
- (f) Requirements relating to the frequency of taking milk samples, and to the laboratory examination thereof;
- (g) Specifications for certified milk, grade "A" raw milk, and grade "A" pasteurized milk; and
- (h) One of two alternative devices for punishing violations of grade requirements, namely—

For cities which wish to maintain high grade supplies by the de-grading method this section should provide that when a given milk supply is found to violate the specifications under which it is labeled, it shall be labeled with one of a number of lower-grade letters, depending upon the nature of the violation. In this case the specifications for the various lower-grade labels should be added to section (g).

For cities which wish to maintain high-grade supplies by the permit-revocation method, this section should provide that when a given milk supply is found to violate the specifications under which it is labeled it shall be barred from the market by revocation of permit. In this form of ordinance the lower-grade specifications need not be included in section (g).

- (i) The usual sections relating to penalties; repeal of conflicting, prior legislation; date of effect; and unconstitutionality.

State milk laws or regulations.—It is generally conceded that centralized and standardized administration tends to lead to greater efficiency and to a lower per capita cost, but may also lead to an undesirable expansion of bureaucracy. On the other hand, decentralized administration, if undirected, tends to lead to inconsistency and inefficiency of method. The subcommittee believes that so far as possible every municipality should regulate its own milk supplies, but that all municipalities should attempt to secure the advantages

of centralized administration, without incurring its disadvantages, through a voluntary program of standardization of methods.

The opinion is held in some States, however, that milk supervision should be placed on a State law basis. For States which prefer this plan the subcommittee recommends that the State law contain essentially the elements previously enumerated for municipal milk ordinances. The law may be enforced either directly by State personnel or may make enforcement by all municipalities in a specified classification mandatory.

States which desire to promote a *voluntary* uniformity of municipal supervision through State legislation may pass essentially the same regulations as above except that provision is made that they shall be in force only in such localities in which they are approved by the city or county health department.

Finally many States, probably the majority for many years, will wish to promote voluntary uniformity entirely without the agency of State legislation. For these the best plan is for the State to promulgate an *advisory* standard municipal milk ordinance and to encourage its local adoption.

The subcommittee believes that there is as yet insufficient evidence to justify a conclusion as to the relative excellence of these methods.

Federal legislation relative to the public health aspects of milk and milk products.—The Federal Government is now authorized by Congress, and should continue to be so authorized—

(a) To conduct research and to make investigations and surveys on all phases of the public health supervision of milk and milk products, and to publish the results thereof;

(b) To enforce legislation relating to the interstate aspects of the public health supervision of milk and milk products; and

(c) To give advice and cooperative assistance to State and local public health authorities with reference to the public health aspects of milk and milk products.

What agencies should enforce the laws or regulations relating to the public health supervision of milk supplies?—The supervision of milk, cream, and other dairy products is of vital public health concern and economic importance, and should receive the coordinated attention of all State and local agencies, including public health authorities, agricultural departments, and agricultural, educational, and extension organizations within the State or community. The subcommittee recommends that inasmuch as the laws and regulations in question deal only with measures which are designed primarily to protect the public health, they should, where practicable, be made the function of health authorities, local, State, and Federal. The public health supervision of municipal milk supplies should obviously be the function of governmental departments primarily dedicated to

the public health point of view and technically trained in the recognition of all public health aspects of the problem.

HOW SHOULD THE RESULTS OF THE ENFORCEMENT OF THE LAWS OR REGULATIONS FOR THE PUBLIC HEALTH SUPERVISION OF MILK SUPPLIES BE EVALUATED?

Periodic ratings of the public-health status of milk supplies are necessary in order to insure a constantly maintained alertness and efficiency on the part of the responsible public-health officials and in order to provide a measure of progress from year to year. The subcommittee recommends that all municipalities should be surveyed and rated as frequently as practicable.

All such ratings should be based upon a common standard in order that they may be comparable. The grade A raw milk and grade A pasteurized milk requirements of the Standard Milk Ordinance may conveniently be used as such a common standard. These grades are the most widely used milk standards in existence to-day. They represent standards of quality which, if satisfied, would make the raw milk as safe as raw milk can practicably be made, and would make the pasteurized milk as safe as any milk can be made. Following is a discussion of a method of determining municipal, State, and Federal ratings.

The determination of municipal milk-sanitation ratings.—A proper milk-sanitation rating is one which measures the percentage extent to which all practicable public-health precautions have been applied. Such a rating can therefore be obtained by determining the percentages of the milk supply complying with each of those precautions and then finding the weighted average of these percentages. The weighting should be done on the basis of the relative importance of the various precautions. Such a system of weights has been developed by the Public Health Service in connection with its survey methods.

In order to obtain a comprehensive index it is advisable to compute two specific ratings, namely, the rating of the retail raw milk and the rating of the pasteurized milk. These two ratings together with the percentage of milk pasteurized will give a valuable estimate of the protection enjoyed by the milk consumer.

The determination of State and national ratings.—State ratings can be computed by determining the average of the municipal ratings, weighted on a gallonage basis. National ratings can be computed by determining the average of the State ratings, weighted on a gallonage basis, or by determining the average of the ratings of a sufficiently large group of representative cities, weighted on a gallonage basis.

The rating of enforcement methods.—In addition to the above ratings of the results of enforcement effort, the subcommittee further believes that the characteristics of the effort itself should be rated in

order to make apparent how effort and result are related, and what specific defect in effort had led to any given, low "result rating."

The rating of effort may be accomplished by establishing a schedule of enforcement measures, such as inspection, sampling, etc., and estimating on a percentage basis the degree of completeness with which the health officer has applied each measure. The average of these percentages, weighted on a relative importance basis, will yield a useful effort rating.

WHAT IS THE PRESENT STATUS OF THE PUBLIC HEALTH SUPERVISION OF MILK SUPPLIES IN THE UNITED STATES?

This question can be answered only by applying some standard yardstick, such as a standard schedule of items of sanitation. The most widely used schedule of public health requirements for milk control in use in the United States to-day is that embodied in the Standard Milk Ordinance. Therefore, the subcommittee has studied rating surveys made on that basis by the Public Health Service during the past several years.

These surveys include in all 430 American cities with a total population of 13,290,669. They are located in 21 States. Of the 430 cities, 247 had passed the Standard Milk Ordinance from a few months to seven years prior to the date of survey.

The following tables give the results of the surveys, computed on the basis of the evaluation method described in the preceding chapter of this report.

It should be noted that the figures in the tables are subject to minor revision after the Public Health Service has completed its surveys of all States. Any necessary revisions will be included in a supplementary report.

Inasmuch as the rating is based upon the items of sanitation required for grade "A" raw and grade "A" pasteurized milk in the Standard Milk Ordinance the following table gives separately the figures for Standard Ordinance and nonstandard Ordinance cities:

TABLE 1.—*Average status of the public health supervision of milk supplies in American municipalities, 1929-30*

	Cities enforcing provisions of Standard Ordinance	Cities enforcing other standards
Total number of cities surveyed.....	247	183
Total population of cities surveyed.....	4,472,236	8,818,433
Total number of States in which cities are located.....	14	11
Total daily milk sales represented in survey.....	330,673	981,108
Total number of retail raw milk dairies surveyed.....	3,002	2,409
Total number of pasteurization plant producers surveyed.....	2,494	5,003
Total number of pasteurization plants surveyed.....	237	900
Average percentage of milk pasteurized.....	50	90
Average rating of raw milk.....	do.	65
Average rating of pasteurized milk.....	do.	60

From Table 1 it is evident that the raw milk sold in cities enforcing the Standard Ordinance averages 90 per cent compliance with the grade "A" raw milk requirements, and that the pasteurized milk sold averages 87 per cent compliance with the grade "A" pasteurized milk requirements, as compared with compliance figures of 65 per cent and 60 per cent, respectively, in cities enforcing other ordinances. Whenever the milk supply is improved in quality, consumption invariably increases.*

The difference in the percentage of milk pasteurized in these two groups represents a regional difference and not a difference in the two groups of milk regulations. This is demonstrated by the fact that the quantity of pasteurized milk in the cities enforcing this standard milk ordinance has doubled within an average period of approximately three years.

The higher ratings shown by cities enforcing the Standard Ordinance should not be taken as implying that no other type of ordinance will yield as high ratings. In fact it is undoubtedly true that many cities enforcing other types of ordinances have produced excellent milk supplies. The above figures represent averages only for the areas surveyed.

In addition to the above figures the subcommittee has considered it advisable to present an analysis of the survey results by size of city. These are given in Table 2, from which the following conclusions are noted:

- (a) Retail raw milk tends to improve in quality as the size of the city increases.
- (b) The quality of pasteurized milk shows no consistent trend, but there is a decided improvement in pasteurized milk when the 100,000 population group is reached.
- (c) The percentage of milk pasteurized increases with size of city.
- (d) The average quality ratings for both raw and pasteurized milk are consistently higher for cities enforcing the Standard Ordinance than for cities of the group studied enforcing other standards, throughout the range of population groups.

TABLE 2.—*Average status of the public health supervision of milk supplies in American municipalities by size of city, 1929-30*

	Cities enforcing provisions of the Standard Ordinance				Cities enforcing other ordinances			
	Under 10,000	10,000 to 50,000	50,000 to 100,000	100,000 and over	Under 10,000	10,000 to 50,000	50,000 to 100,000	100,000 and over
Total number of cities surveyed	139	85	17	6	87	68	9	19
Total population of cities surveyed	502,071	1,592,756	1,105,142	1,182,267	453,402	1,529,680	645,397	6,189,954
Total number of States in which cities are located	11	13	9	2	11	11	5	7
Total daily milk sales, gallons	35,637	109,745	83,534	101,757	41,059	156,667	77,064	706,298
Average percentage of milk pasteurized per cent.	19	42	46	73	48	73	91	96
Average rating of raw milk per cent.	88	89	90	95	55	61	66	78
Average rating of pasteurized milk per cent.	82	82	81	92	53	53	56	62

WHAT RECOMMENDATIONS SHOULD THE WHITE HOUSE CONFERENCE
MAKE WITH REFERENCE TO THE FUTURE IMPROVEMENT OF THE
PUBLIC HEALTH SUPERVISION OF MILK SUPPLIES IN THE UNITED
STATES?

The subcommittee suggests that the following recommendations relative to the future improvement of the public health supervision of American municipal milk supplies be included with the general recommendations of the White House conference.

(a) Municipal milk-control measures should include supervision of the inspection of farms and plants, physical examination and testing of cows, laboratory examination of milk, physical examination of workers and residents at farms and plants, including laboratory examination of body discharges, and pasteurization control.

(b) All health authorities should persistently recommend to American milk consumers that pasteurization is an added factor of safety in a milk supply.

(c) All laws or regulations for the public health supervision of milk supplies, whether local, State, or Federal, should incorporate in so far as practicable uniform requirements at least the equivalent of those now contained in the standard milk ordinance recommended by the United States Public Health Service.

(d) The Federal Government should continue its present functions in research, investigations, surveys, publications, and advisory assistance to local and State health authorities with reference to the public-health aspects of milk and milk products.

(e) The supervision of milk, cream, and other dairy products is of vital public-health concern and economic importance, and should receive the coordinated attention of all State and local agencies, including public health authorities, agricultural departments, and agricultural, educational, and extension organizations within the State or community. The subcommittee recommends that inasmuch as the laws and regulations in question deal only with measures which are designed primarily to protect the public health, they should, where practicable, be made the function of health authorities, local, State, and Federal. The public-health supervision of municipal milk supplies should obviously be the function of governmental departments primarily dedicated to the public-health point of view and technically trained in the recognition of all public-health aspects of the problem.

(f) The milk supplies of all municipalities should be surveyed and rated as frequently as practicable in accordance with the method previously described in this report.

(g) Milk-control areas should provide adequate enforcement machinery in order to insure satisfactory results.

LESLIE C. FRANK, *Chairman.*

CHAS. O. H. LAUGHINGHOUSE, M. D.¹

FRANK C. WILSON.

Report of Subcommittee on the Nutritional Aspects of Milk

Milk is a fluid secreted by the mammary gland for the nourishment of the young. It is variable in composition, depending upon species, breed, age, period of lactation, intervals between emptying the gland, time of year, and diet. Analyses of individual samples are not trustworthy in furnishing evidence for the composition of all milks. Cow's milk contains more proteins and ash than does human milk. If fed to infants the former must be modified by dilution with water and addition of carbohydrate. The fat content may be regulated by selecting milk from different breeds of cows. The principal constituents of milk are protein (casein, lactalbumin, lactoglobulin), carbohydrate (lactose), fat, mineral salts, vitamins, pigments, enzymes, and traces of numerous other substances. Most investigations have been carried out with cow's milk.

Casein is the protein most easily separated in a state of relative purity from milk. It has been more studied than any other protein. There is much reason to believe that even the purest casein still contains impurities. Some evidence has been brought forward to indicate that it is of dual nature. It is doubtful whether pure casein has ever been prepared. Even the question of homogeneity of casein has been raised. No significant differences have been detected in the elementary composition of caseins from different milks. Highly delicate immunological reactions seem to show that casein from the milk of one species is the same as that from the milk of another.

That two samples of milk with the same composition may not be equally readily digested by infants is shown by common experience. Some have attributed this to the differences in the size of the fat globule, others to the state of division of the curd. Human milk is well tolerated by infants, yet it contains fat globules of all sizes ranging from the smallest to the largest found in cow's milk. This seems to argue against the validity of the fat globule size theory of the relation between the state of fat in a milk and its quality in infant feeding.

Toughness and coarseness of curd have often been mentioned as qualities affecting the digestibility of milk. Curd of cow's milk is precipitated to a varying extent by hydrochloric acid, depending upon the breed of the cow. The precipitated curd from certain breeds is coarser than that from others. Hill has shown that the curds of milk from individual cows vary in toughness. This applies to all breeds.

¹ Deceased.

Toughness of curd remains fairly constant throughout the lactation period. Curd is somewhat tougher in the early stages of lactation and becomes softer toward the end. Toughness is not influenced by the fat content and there is no good evidence that the feed of the cow exerts any effect. The curd property, which is an individual characteristic of the cow, is believed to be an inheritable character. Hill found that milk with curds of varying toughness are not tolerated equally well by infants. Experience seems to have shown that an infant fed soft curd milk may thrive, whereas fed tough curd milk it may have digestive disturbances.

Milk is an almost complete food. Its proteins are of high quality. This means that they furnish a mixture of amino-acids in favorable quantitative relations for transmission into body proteins during growth. Its value may be enhanced by the addition of the sulphur-containing amino-acid cystine.

The carbohydrate lactose contributes about 29 per cent of all calories coming from milk. The fat of milk is especially important in that it is one of the few food fats containing vitamin A. The ash of milk is especially rich in calcium. Since all cereals, meats, eggs, roots, tubers, and fruits are deficient in this element, milk is an important supplementary food for providing calcium. The absolute amount of calcium which the daily diet of an infant or child should contain has been the subject of a number of investigations, but the question has not been satisfactorily answered. All experimenters are agreed that the calcium of milk is easier of assimilation than is this element from vegetables. Since in the diet of the infant and young child the calcium is derived largely from milk, the calcium requirements of the child will determine in great measure the content of milk in its food. It is generally agreed that all growing children up to the age of 14 should consume a liberal amount of milk in their daily diet unless there are specific contra-indications. The absolute amount of calcium daily retained by children increases as the milk in the diet is increased up to approximately 1 quart a day.

The most striking deficiency of milk is iron. Infants and young animals restricted to milk or milk and iron-poor foods for a considerable period develop anemia. Studies on blood regeneration have demonstrated that iron can not be utilized for haemoglobin formation unless accompanied by a small amount of copper, and milk has been shown to be deficient in this element. The nutritional anemias which have been studied in animals have not been investigated thoroughly in infants, and so little can be said on this subject as respects human nutrition. The proportion of iron in the body is higher at birth than at any subsequent period. As the body grows in weight and size the proportion of iron decreases if the food is

deficient in iron, as is often the case in improperly fed infants and young children.

Milk fat is a good source of vitamin A and contains a small amount of both D and E. The nonfat portion of milk appears to be somewhat deficient in vitamin B, the antineuritic principle, but to contain more of the antipellagra principle, vitamin G. Raw milk always contains some of the antiscorbutic vitamin C. The studies of Macy have shown a pronounced deficiency of vitamin B in both human and cow's milks as to indicate the advisability of supplementing the diet of the infant at an early age with a source of this vitamin richer than milk. It is of great significance that the content of vitamin B in the milk can be markedly increased by including in the diet of a lactating mother foods rich in this principle.

The composition of milk may be varied by a number of conditions, among them the diet of the mother. Milk yield as well as composition may be so influenced. Overfeeding produces no change either in yield or composition of milk. Underfeeding produces significant changes, especially in an increase in the percentage of fat in the milk, but the yield tends to fall off. Raising the protein content of the food increases the quantity of milk produced. The quality as well as the quantity of protein of the food exerts complex effects upon milk composition. The inorganic constituents of milk remain fairly constant over relatively long periods even though the amounts of individual elements in the mother's diet vary within wide limits. Lactating animals remain for long periods in marked negative calcium-phosphorus balances while maintaining the normal milk yields. On diets deficient in these elements the mother therefore sacrifices herself to maintain the composition of the milk constant for the preservation of her young. Changes in the vitamin content of the diet influence directly the content of these nutrients in the milk rather than the amount of milk. The vitamin content of the milk may be decreased by deficient diets more readily than can be the content of any other milk constituent.

Colostrum, the fluid secreted by the mammary gland during the early days of lactation, differs from milk in the presence of certain cells known as colostrum bodies. It contains also a high content of globulin. These peculiarities in its composition have suggested that it has some special function in protecting the infant. Colostrum contains antibodies. The content of these parallels the amount of globulin. Certain species of young are susceptible to infectious diseases when colostrum is not given them, whereas the young fed from the breast immediately after birth remain free from such diseases. This has not been shown to apply to human subjects. In cattle and goats it appears especially that there is a transmission of immunity from mother to new-born young through the agency of colostrum,

but the latter appears to play a negligible rôle in the transmission of immunity in rats, guinea pigs, and rabbits. The belief prevails that colostrum is not essential to the infant, but scantiness of literature upon the subject and the contradictory findings of different workers make further investigations on this subject desirable.

This report includes in concise form the important facts concerning pasteurized milk, condensed milk, evaporated milk, powdered and dried milks, and malted milk, from the nutritional standpoint. There has been a growing tendency in recent years to pasteurize the milk supplies of cities. The percentage of milk pasteurized is far greater in large cities than in small cities, while villages and country districts still have generally only a raw milk supply. In 1924 the cities of over 500,000 population pasteurized 98.1 per cent of their milk, whereas cities of less than 10,000 pasteurized 33.6 per cent of their milk. Nearly all health authorities in this country are urging the pasteurization of market milk, since this prevents the dissemination of disease through this food.

The production of condensed milk has tended to decrease during recent years, but in 1928, 3,311,357 cases of 48 cans each were produced in the United States. Condensed milk contains about 42 per cent of sugar and 27.4 per cent of water. A number of investigators have shown that the vitamin content of condensed milk is practically the same as ordinary raw whole milk. This is evidently due to the fact that the evaporation is carried out in a vacuum so that there is little tendency to the oxidation of vitamin C.

Many investigations have established a low bacterial content of condensed milks, but they all contain some bacteria and molds. The development of these is inhibited by the high content of sugar and there is evidence that storage in sealed containers results in a decrease in the number of organisms which survive the canning process.

There has been a tendency in recent years away from the use of condensed milk in infant feeding, although many pediatricians still continue to use it in special cases. Its principal use is for household and culinary purposes and in bread making and the manufacture of ice cream.

While the production of condensed milk has tended to decrease, the production of evaporated milk steadily increased between the years 1912 and 1918. Since 1918 the annual production has ranged between 19,000,000 and 25,000,000 cases of 48 cans each. Evaporated milk has enjoyed increasing popularity in infant feeding in recent years.

In evaporated milk the antiscorbutic vitamin is completely destroyed. Otherwise the fat value of evaporated milk is not sufficiently different from fresh milk to warrant an unfavorable comparison. It is practically sterile bacteriologically and of superior digestibility.

Powdered whole milk manufacture has increased from about 4,000,-000 pounds in 1918 to nearly 11,000,000 pounds in 1926. Powdered skim milk during the same period increased from 26,000,000 pounds to nearly 92,000,000 pounds. The total production of all dried milk products in 1927 amounted to 196,396,000 pounds. Dried milk is used as a general substitute for liquid milk, infant feeding, household and culinary purposes, and industrially in bread making, the manufacture of candy, confectionery, and ice cream. To some extent it is used in stock feeding.

From the standpoint of nutritive properties it may be said that dried milks manufactured by either the spray or roller processes compare very favorably in all respects except the antiscorbutic property with fresh milk.

RECOMMENDATIONS

Notwithstanding the immense amount of research which has been done upon milk, there still remain a number of very important questions which require further study. Among these are the following:

1. Studies on curd tension, which is a measure of the toughness of the curd formed by rennet coagulation, seem to have established a unique value of soft curd milks in infant feeding. This property applies also to older children and adults whose digestive powers are not vigorous. Further confirmation of the work thus far done in feeding soft curd milks to infants is highly desirable.

It appears that the curd tension of milk can be greatly reduced—that is, the curd softened—by homogenization of milk, which is the breaking up of the fat globules into finer globules by mechanical means. It may thus prove feasible to render all milk soft curd milk and so improve its digestibility.

2. The vitamin content of milk, especially the water-soluble vitamins B and G, as determined by the biological assay, should be further studied. Such studies should be correlated with accurate determinations of the nutritive needs of the young for these vitamins.

3. A most important phase of nutritional research is that related to the biological values of proteins. Investigators have been much handicapped by their inability to secure considerable amounts of the 18 or more individual amino-acids into which proteins are digested. Very little progress has been made during the past 25 years in devising procedures for the isolation of amino-acids in pure form. Studies in this direction are highly desirable, and form a phase of research on the limiting factors in a chemical sense of milk as a food.

4. Further metabolism studies should be made on children to determine the optimum proportions of milk in the diet. The disagreement of experienced scientists and clinicians on this point emphasizes the need for information as to the proportions between milk

and other foods suitable for inclusion in the diet of infants and children which afford the optimum supplementary relations. Such studies should include calcium assimilation, the effect of the ratio of calcium to phosphorus, the adequacy of vitamins B and G in the diet, and the influence of the proportion of milk to other foods on the biological value of the total protein content of the food combination studied.

5. Further studies are recommended on the nature of the colostrum cell and its significance in the nutrition of the new-born.

6. The demonstration of Macy and coworkers of the nutritive deficiencies of human milks when produced by women whose diet is not satisfactory, and that the inclusion of certain vitamin-rich foods tends to markedly improve the quality of the milk, emphasizes the importance of further fundamental studies of this character.

7. There is need of further standardization of apparatus, installation, and operation of pasteurizing equipment in milk plants. A fundamental research on the several types of equipment for pasteurizing milk is recommended.

8. Since there are areas where milk could be economically produced but where no market is available near at hand, it appears economically desirable to increase the production of milk powders, evaporated milk, and condensed milk. From a standpoint of economy it is also imperative that the surplus milk during the flush season be preserved by one or another of these processes. A careful research on the economic aspects of replacement of liquid pasteurized milk or certified milk by milk powder, condensed, and evaporated milks is of importance.

9. Further study is needed by pediatricians of the specific conditions in which different kinds of milks (certified, pasteurized market, boiled, condensed, evaporated, milk powders, acidified milks, etc.) are indicated in infant feeding.

10. It is known that at least 10 inorganic elements are essential in the diet for normal nutrition. There are a number of inorganic elements present in minute amounts in the various foods including milk. Their significance, if any, is still unknown. Investigations to demonstrate which of these play a physiological rôle might yield important results.

11. Further studies are desirable on the chemistry of casein, its amino-acid composition and the supplementary relations of casein to other heat coagulable proteins of milk.

12. A study of the nutritive qualities of whey and whey powder. This product, now manufactured in small amounts, seems to possess, when taken in the right amounts, a mild regulatory action on the

intestinal tract which may make it desirable to recommend its wider use in nutrition.

Dr. E. V. McCOLLUM, *Chairman.*

Dr. F. W. SCHULTZ.

Dr. JAMES A. TOBEY.

Report of Subcommittee on Economic Aspects of Milk

I. CONSUMPTION OF FLUID MILK AND CREAM

Milk and the dairy industry are inseparably linked to the Nation's health and the normal growth and development of its people. Scientific studies have shown that the food people eat, especially during the periods of rapid growth in early childhood, has a lasting effect on the size of the entire race. President Hoover, when addressing The World's Dairy Congress in 1923, as Secretary of the Department of Commerce, said: "The exhaustive researches of nutritional science during the last two decades have, by the demonstration of the imperative need of dairy products for the special growth and development of children, raised this industry to one of the deepest national and community concern, for, as I have said, it is not alone the well-being of our people but it is the very growth and the virility of our race to which you contribute."

According to the latest figures available, the per capita consumption of fluid milk in 1926 in the United States was 55.3 gallons per year, or slightly more than 1 pint per day. In 1926, the most recent year for which figures are available, four European countries exceeded the United States in the per capita consumption of milk. These were Finland, with a consumption of 83.9 gallons; Switzerland, 70.4 gallons; Sweden, 69.7 gallons; and Norway, 56.0 gallons.

Nutrition experts state that for proper nutrition and health a normal growing child should receive approximately a quart of milk daily during the years of rapid growth, and that each adult should consume at least a quart of milk or its equivalent in butter, cheese, and ice cream.

Surveys have shown that the average child is getting considerably less than a quart of milk a day. On the average farm more milk is consumed per capita than in cities, though this is not true in certain specific localities. The increase in the per capita consumption of milk for the United States as a whole has been a gradual one. In 1921 the yearly per capita consumption was 49 gallons as compared with 55.3 gallons in 1926.

Doctor Sherman, of Columbia University, after extensive experiments, concluded that a child should receive a quart of milk per day to insure the optimum storage of calcium and phosphorus and the best development of bones and teeth. He also said that the calcium in

milk is superior to the calcium in vegetables as a source of that element for growing children.

Production in the United States is ample to care for future increases in consumption of fluid milk. If the per capita consumption should increase as much as 15 per cent, it would take only 55 per cent of the present total production. Such an increase in consumption of fluid milk would mean that it would be necessary to divert a part of the milk supply that now is used for manufacturing purposes into fluid milk markets. In June of this year the average price received at the farm for milk to be consumed as fluid milk, was \$2.70 per hundred-weight, as compared to \$1.60 for milk sold to be manufactured into butter, cheese, and other products. If children, young people, and adults were consuming the quantity of milk required for proper nutrition and health, the diversion of this extra milk from butter, cheese, and other products to fluid-milk uses, could be accomplished very readily.

II. CONSUMPTION OF OTHER MILK PRODUCTS

The value of condensed and evaporated milk in place of fluid milk was fully demonstrated during and immediately after the World War. In 1919 the equivalent of more than 2,000,000,000 pounds of milk was exported to Europe in condensed, evaporated, or dried form.

Until recently, condensed, evaporated, and dried milk were consumed principally in sections where dairying had not been developed, or where geographic or climatic conditions made dairying impossible or unprofitable. In more recent years, these products have been sold in increasing amounts in home markets.

Physicians and dietitians have found evaporated and dried milk to be valuable in formulas for infant feeding. The use of these products in home cooking has increased also. Bakers and candy makers are using dried skimmed milk in their products, and ice cream manufacturers use dried skimmed milk as well as plain evaporated milk and sweet-cream unsalted butter.

Nearly 47 per cent of the milk produced in the United States is used as fluid milk or cream. The per capita consumption of milk in 1926 was 55.3 gallons; butter, 17.82 pounds; cheese, 4.36 pounds; condensed and evaporated milk, 14.32 pounds; and ice cream, 2.77 gallons. In 1928 our net imports of butter and cheese were 761,279 pounds of butter and 77,833,325 pounds of cheese. In the same year our exports of sweetened and unsweetened condensed milk exceeded our imports by 112,804,852 pounds, and our exports of dried milk exceeded our imports by 1,156,626 pounds. For the past few years the United States has been on an import basis.

III. PRODUCTION OF MILK

The amount of milk estimated to have been produced in the United States in 1926 was 120,766,000,000 pounds. Our principal milk-producing area extends from the New England and North Atlantic States in the East to Minnesota and the northern States of the Mississippi Valley on the west. Also in sections of the States of California, Oregon, and Washington dairying is carried on extensively.

Formerly intensive dairying was practiced only close to large centers of population, which required large quantities of milk for consumption as fluid milk. However, the geographic trend of dairying in the last few years has been toward the better soils of the Corn Belt and extending northwest into Wisconsin, Minnesota, and the Dakotas.

Conditions which are favorable to dairying are: Climate and soil suitable for growing corn for silage and legumes, especially alfalfa; fields of a size and contour suitable for power farming; farms close enough to centers of population so that they will be convenient to good markets; low priced, efficient labor, and good pastures with plenty of rainfall.

The United States Department of Agriculture and the various State experiment stations have carried on enormous amounts of research work to reduce the cost of production through the breeding, selection, management, and feeding of dairy cattle. These studies have shown that there is a direct relation between the production per cow and income, and that the dairyman who uses modern methods in the elimination of the low-producing cows in his herd has the highest income.

Dairy herd improvement associations provide a very effective means for discovering low-producing cows. On January 1, 1930, there were 1,143 dairy herd improvement associations in the United States. In these associations there were 507,549 cows on test. This number of cows was 2.3 per cent of the total of 22,499,000 cows in the United States, as estimated by the United States Bureau of Agricultural Economics. In 1928 the average annual production of the cows in these associations was 7,464 pounds of milk, or 295 pounds of butterfat, which was 60 per cent greater than the average production for all the milk cows in the United States.

The rapid growth of dairying in the Corn Belt in the last few years promises to continue. There are good reasons why dairying should increase in this section. Corn and alfalfa grow there very well. Sweetclover fits into the cropping system. Power farming is entirely practical for raising crops. The region is far enough away from the industrial centers for labor to be obtained economically, yet close enough to provide markets for milk or its products.

Grain farms, especially the wheat-growing sections in the Red River Valley, are beginning to show signs of soil exhaustion. This condition is necessitating a change in the cropping system and the inclusion of the growing of cattle, either beef or dairy.

For many years State and Federal agencies have been making studies and investigations for the purpose of increasing efficiency in the production of milk, and there is no question but that milk can be produced at a lower cost by using the best-known methods. This would mean that fewer cows would be required for producing the Nation's milk supply.

IV. MARKETING

The majority of the market milk produced in the United States is sold in individual transactions between the producer and the processor or distributor. A portion is sold and delivered by the producer direct to the consumer. The rest is sold by what are known as fluid-milk marketing associations, which are cooperative organizations of producers. In 1928 these associations marketed about two-fifths of all the milk sold in the United States, a fraction valued at more than \$325,000,000.

The period of greatest growth of these associations began during the World War. In general, the associations are of two types, depending on the kind of service rendered. One is the bargaining type and the other is the operating or marketing type. The operating or marketing association has in addition to the bargaining function, facilities for the physical handling of the milk. Some associations of the operating type have receiving stations in the country, where the milk is received, cooled, and shipped to dealers in the cities. Such stations may have facilities for manufacturing surplus milk into various dairy products.

Adjusting the production of milk to the consumptive demands is one of the most difficult problems connected with the marketing of milk, and various buying plans have been worked out for the purpose of equalizing production throughout the year as far as is possible. Under the so-called "basic surplus" plan each producer is assigned a definite volume of production, and for all milk produced in excess of this basic volume he receives a surplus or lower price. Each producer's basic quantity is usually determined by his average production during the previous October, November, and December, the period of the year when the supply and demand for market milk most nearly balances. If a producer produces say an average of 3,000 pounds for these three months, then 3,000 pounds represents the base for this producer for the year, and he will receive market milk prices for milk delivered each month up to his basic 3,000 pounds. For any milk over 3,000 pounds, he will receive a less price according to a

schedule worked out in the plan. Modifications of the plan to suit local conditions have been adopted by associations in different States.

The "contract plan" is a modification of the basic surplus plan designed to equalize the supply of milk throughout the year. Under this plan as used by the Connecticut Milk Producers' Association, the producer upon signing the contract previous to March 31 of any year states the quantity of milk he proposes to deliver daily for the next 12 months, beginning April 1. The producer is then penalized for production in excess of the amount specified or for shipping a less amount than that specified. The money collected from penalties does not go to the distributor but is pooled by the producers and pro-rated among producers in such a way that it is equivalent to a bonus received by the producers having even production.

In some cities, the producer or association receives one price for milk used as fluid milk and a lower price for any milk which has to be made up into by-products. Many cities and sections of the country consider the butterfat content in paying for fluid milk. Milk testing 3.5 or 4.0 per cent of butterfat may be taken as the base, with a differential used for figuring premiums to be paid for milk testing higher than the base or for cuts in the price for milk testing below the base. Also, in some sections premiums are paid to producers for maintaining certain conditions of sanitation in relation to their milk production.

V. TRANSPORTATION, PROCESSING, AND DELIVERY

The rapid growth of cities and the increases in the per capita consumption of milk have had the effect of enlarging the milk sheds from which many of the cities receive their milk. Improvement in motor trucks and roads and the introduction of tank trucks and tank cars, with modern means of insulation and refrigeration, have made it possible to extend the milk-producing areas.

The adoption of tank trucks and tank cars has stimulated the establishment of country receiving stations. In April, 1928, more than 75 per cent of Chicago's supply of milk was being shipped to that city by tank truck or tank car.

Tank trucks are used for routes covering 120 to 150 miles for the round trip, and tank cars make it entirely practical to extend a city's milk-shed beyond the 300 to 500-mile zone.

In Chicago, in 1925-26, it took approximately 51 cents of the consumer's dollar to pay for hauling the milk into the city, processing, bottling, and delivering it to the consumer. Forty-five cents of the consumer's dollar was received by the milk producer, and the balance, less than 4 cents, was net profit to the final distributor. Data tabulated by the Bureau of Dairy Industry of the United States Department of Agriculture in 1928 showed that the f. o. b. price of

milk in different cities ranged from 37.0 per cent of the retail price of milk (in Denver, Colo.), to 64.1 per cent (in Richmond, Va.).

A study made in Chicago in 1926 showed that the price received from the ultimate consumer for a quart of market milk averaged 12.9 cents. The farmer received 5.3 cents for this milk, leaving a gross margin of 7.5 cents per quart. Purchasing, receiving, and processing cost 2.2 cents per quart. It took 4.6 cents to sell and deliver the quart. General and administrative expenses amounted to 0.3 cent, and net income was not quite 0.5 cent per quart.

The grocery or general store has a limited function in supplying milk in most places. "Very few stores," according to Kelly and Clement, "will care to provide refrigeration and attend to the selling of the milk for less than 2 cents per quart. Therefore, the price that the consumer must pay at the store is usually as high as that delivered at his own door, and in special instances the price at the store is higher, even though the consumer comes to the store for the milk."

VI. SANITARY QUALITY OF MILK AND CREAM

The dairy industry could add millions of dollars to its annual receipts if only milk of the finest quality was produced. Ten or fifteen years ago this situation was accepted as inevitable, and it was difficult in some places to deliver sweet milk of good flavor to the market. As a result of years of constant work by agricultural and public health agencies, our farms and milk plants and their products are on a much higher plane of sanitation. This improvement has been brought about in a number of ways. For example, the United States Department of Agriculture has for more than 30 years been studying the question of dairy sanitation and methods of supplying the consumer with adequate and wholesome milk supplies. The State colleges of agriculture and agricultural experiment stations, State departments of agriculture, and other agencies, have been working effectively along this same line.

The California State Department of Agriculture has done one of the most effective pieces of dairy sanitation work. The State department of agriculture, because of its close touch with producers and manufacturers of dairy products, has an unusual opportunity to study methods of milk production and to devise practical and efficient methods for sanitary control. California is cited because it provides one of the best working examples of an economical State-wide program for the protection of the public health, improvement of the product, and the instruction of the dairy industry in the best known methods for the economical and sanitary production and processing of dairy products.

The United States Department of Agriculture and the various State agricultural colleges have the research and extension facilities and personnel not only to study questions of quality improvement, but to disseminate information on the subject among producers and manufacturers of the Nation. The department has outlined a program of quality improvement which can be, and is being, promoted by the State extension services in their work with adults and the boys and girls of the 4-H clubs. A number of States have already become interested in this program and are taking active steps to put it into effect. In 1929, through the cooperative extension work and the general distribution of information in printed and other forms, 78,552 farms improved their practice in the production and care of milk to make their product more sanitary. A number of other agricultural agencies and trade organizations have contributed to the raising of the general level of the quality of milk.

The modern trend of the dairy industry, in its steps to reduce losses through improperly produced milk and cream and to insure the consumer of an abundant supply of wholesome milk, is illustrated by some of the work that is being done by trade organizations. In 1929 seven dairy organizations which were conducting quality-control work on market milk and cream were studied by the United States Bureau of Dairy Industry. Five of these were producers' organizations and the other two were dairy councils. This quality-control work included routine inspection of dairy farms and instruction of dairymen in methods of producing milk of better quality. It also involved laboratory tests to determine the quality of the milk delivered by individual farmers. In one of the producers' associations 69 field men were employed for farm and country work, and in addition to this the organization employed 7 veterinarians and 16 laboratory workers. The cost of the quality-control work done by dairy organizations ranges from \$6,000 to more than \$250,000 per year per organization. Premiums ranging from 5 cents to 58 cents per 100 pounds have been paid for high-quality milk, and deductions ranging from 15 cents to 25 cents per 100 pounds have been made for lower quality.

Aside from agricultural agencies health organizations, both official and semiofficial, have done a vast amount of work in improving the milk supplies. Among the bodies which have worked on milk control are the United States Public Health Service; State, city, and county boards of health; the International Association of Dairy and Milk Inspectors; the American Public Health Association; the American Child Health Association; American Association of Medical Milk Commissions; and other similar agencies.

Reports gathered from city health departments in 1929 give tangible evidence of the improvement of the milk supplies.

The eradication program relative to bovine tuberculosis has a tremendous bearing on the economy of milk production and livestock raising as well as upon the public health. Systematic work along this line began only about 10 years ago, and far-reaching results have already been obtained. Three States—namely, Michigan, Maine, and North Carolina—have been declared free areas by virtue of the fact that this disease has been practically eliminated from these areas under State and Federal supervision.

The abortion disease of cattle is the cause of great losses to the dairy industry, and it may have a significance in relation to the public health where raw milk is consumed. Abortion in dairy cattle, as well as in other livestock, has been found to be closely associated with undulant fever in man. Elimination of the cows infected with this disease from the herd, through the test that has been worked out for this purpose, will remove this source of danger to the human family. It has been found that pasteurization will safeguard the milk supply from this disease. Legislation has been set up in 12 of the 48 States in efforts to control this disease in dairy cattle.

STATEMENTS AND RECOMMENDATIONS

1. The consumption of fluid milk in the United States is too low for proper and economical human nutrition. We are far below the optimum daily consumption of milk for the normal child. Every educational facility should be used to acquaint both adults and children with the desirability of consuming milk and dairy products in adequate amounts. Health agencies both official and voluntary, should more actively encourage greater use of high-quality milk as a nutritional and health protective program.
2. The present production of milk in the United States is ample to provide sufficiently for the optimum consumption of fluid milk on the basis of the present population. A large proportion of our properly supervised market-milk supply is of such quality that it can be recommended for human consumption.
3. Many dairy products and by-products, other than milk, are available in quantity and quality suitable for wider inclusion in the American diet. Some of the whole-milk products may be used in place of whole milk under certain conditions.
4. The prices of milk and other dairy products are reasonable, considering their exceptional food value and cost of production in comparison with other foodstuffs which make comparable demands as to care, expense, and service in production and merchandising. In order that milk of high quality shall be available on an equitable basis to consumers generally the price of milk to the producer should be based, in a general way, upon the market price of butterfat, plus

a sufficient additional amount to cover the additional costs necessary to produce and deliver milk that is high in quality.

5. Educational programs for raising the general level of quality of milk should be more extensively carried on through agricultural agencies thoroughly conversant with proper dairy practice and by the dairy industry itself. Such agencies are in intimate contact with every branch of the dairy industry. Unbalanced programs of dairy sanitation lead to undue costs in producing and processing milk. On the other hand, practical quality improvement work not only serves to protect health and welfare, but is a direct aid to the dairy industry through the elimination of financial losses and the widening of markets.

6. The future fluid-milk supply may come from greater distances from the point of consumption. Cheaper land, labor, and foods are usually available in sections away from large industrial centers. Local production should be encouraged to meet local demands; but where this is impossible, arrangements should be made for the proper shipment of high-quality milk and cream from a distance. To meet such a need, dairy manufacturing plants in strategic locations should be equipped to receive, cool, and ship milk and cream in a sanitary manner. Intensive sanitation work should be done with farmers delivering milk to processing plants. In this way, not only will the total supply of all dairy products be improved in quality, but larger quantities of milk of suitable quality will be available for shipment to city markets. The extension of country milk-receiving stations where milk is received, cooled, and shipped will expand milk-sheds, especially in the South and other sections where cooling on the farm is difficult to accomplish.

7. Every aid should be given to stimulate more economical and efficient milk production. This should expand research and extension along such lines as breeding, feeding, and management of dairy cattle; disease, parasite, and insect control in dairy herds; improvement of pastures and the raising, harvesting, and storing of crops, notably alfalfa, which are especially adapted to dairy farming.

8. Greater attention should be given to methods of transportation, terminal facilities, and warehousing of dairy products for the elimination of waste and improvement of quality.

9. It is essential that milk production be better adjusted to consumption throughout the year, to prevent the seasonal surpluses which tend to disorganize markets. Extension of a rational surplus plan of milk buying will do much to remedy this condition.

10. There should be a more widespread and uniform system of buying milk on the basis of butterfat content and sanitary quality. Payment for additional butterfat over the basic varies from 30 cents to \$1.09 per pound in market-milk centers. In many cases at present the differential is far too low to warrant the additional cost

of producing additional fat, while in others the financial penalty is too severe for milk lower in fat. Clean milk of low bacterial count costs more to produce and is of greater value to plant operators and consumers. As yet the additional payment for high quality is not widely made. An extension of this system will result in rapid improvement of quality generally.

11. It is possible to reduce the cost of processing, bottling, and delivering milk. Studies have shown that many milk plants can make decided improvement in plant arrangement for efficiency, better utilization of labor, and the curtailment of material losses, such as those represented by spilled or wasted milk, broken milk bottles, poorly utilized steam, power, and refrigeration.

12. The production and processing of milk usually are more sanitary and more economical in those plants which handle sufficient volumes of milk to enable them to have ample equipment of the best machinery and skilled technicians and labor, and use the best methods, and operate at or near capacity. Furthermore, the centralization of the milk industry makes it easier to carry on the work of inspection and control.

O. E. REED, *Chairman.*

C. E. GRAY.

FREDERIC HOWE.

General Conclusions and Recommendations

Among certain peoples, infants and children have been reared without a milk supply after the weaning period. Many such children tend to suffer for a few years because the adult type of diet is not suitable for the young child. Prolonged breast feeding is the custom in such places and there is a far greater health hazard to the child after weaning if cow's milk is not provided. In a country such as the United States, where it is economically and agriculturally desirable to produce milk in abundance, it is a sound policy from the physiological point of view to include a liberal amount of milk in every child's diet. Therefore, an adequate supply of safe, good-quality milk should be available for all children. The best information available indicates that approximately a quart of milk, or its equivalent in other dairy products, is desirable daily for the average growing child; but the average child receives considerably less than this amount.

Further research should be conducted to add to the existing knowledge of the nutritional value of milk and milk products. A number of researches in this field are suggested in the report of the subcommittee on the nutritional aspects of milk. Adequate facilities should be provided for researches.

There is ample evidence that milk is an important factor in the transmission of certain communicable diseases unless it is properly produced, processed, and distributed. A study of the reported outbreaks of communicable diseases attributable to milk in the United States indicates that the largest number occur in the smaller communities in many of which the milk supply is not properly supervised and in which the percentage of milk pasteurized is small.

From a study of these outbreaks attributed to dairy products, it appears that improperly supervised fluid milk has been the most frequent offender in the transmission of disease, and that ice cream, cheese, and butter are minor offenders. The latter will, in the future, probably become even less significant in this respect. No evidences were found to indicate that milk powder, condensed milk, or evaporated milk are significant communicable disease vectors.

There is need for further improvement in the public health and quality supervision of the milk supply of this country.

The supervision of milk, cream, and other dairy products is of vital public health concern and economic importance, and should receive the coordinated attention of all State and local agencies, including public health authorities, agricultural departments, and agricultural, educational, and extension organizations within the State or community.

Laws or regulations for the supervision of milk supplies, whether local, State, or Federal, should incorporate in so far as practicable uniform requirements at least the equivalent of those contained in a milk ordinance to be recommended by the United States Public Health Service and the Bureau of Dairy Industry of the United States Department of Agriculture. It is fundamental that all milk supplies should be surveyed and rated as frequently as practicable. Inasmuch as the laws and regulations relating to the public-health supervision of milk supplies deal only with measures which are designed primarily to protect the public health, they should, when practicable, be made the function of health authorities, local, State, and Federal. The public-health supervision of municipal milk supplies should obviously be the function of governmental departments primarily dedicated to the public health point of view and technically trained in the recognition of all public health aspects of the problem.

In the absence of local milk control, the State must assume this responsibility.

Health authorities should recommend to American milk consumers that the general market milk be pasteurized before it is consumed, either in a properly supervised pasteurization plant or at home.

Milk should be bought and sold on a quality basis in order to reward and stimulate good quality.

April 8, 1931

In order that the supervision of milk and milk products may become general, and in order to educate the people as to the importance of adequate milk consumption, the Federal Government should prepare and institute a coordinated program of education and supervision, and the States which have not already done so are urged to develop and put into operation a program coordinated with the Federal program.

DEATHS DURING WEEK ENDED MARCH 14, 1931

Summary of information received by telegraph from industrial insurance companies for the week ended March 14, 1931, and corresponding week of 1930. (From the Weekly Health Index issued by the Bureau of the Census, Department of Commerce)

	Week ended Mar. 14, 1931	Corresponding week, 1930
Policies in force.....	75,096,936	75,564,251
Number of death claims.....	16,248	15,738
Death claims per 1,000 policies in force, annual rate.....	11.3	10.9

Deaths¹ from all causes in certain large cities of the United States during the week ended March 14, 1931, infant mortality, annual death rate, and comparison with corresponding week of 1930. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)

[The rates published in this summary are based upon mid-year population estimates derived from the 1930 census]

City	Week ended Mar. 14, 1931				Corresponding week, 1930		Death rate ² for first 11 weeks	
	Total deaths	Death rate ³	Deaths under 1 year	Infant mortality rate ³	Death rate ³	Deaths under 1 year	1931	1930
Total (81 cities).....	9,420	13.8	849	4.67	13.2	863	14.1	13.3
Akron.....	52	10.5	7	69	8.4	10	8.5	8.8
Albany ⁴	81	12.5	3	59	15.1	6	15.2	16.6
Atlanta.....	110	20.7	20	204	17.7	9	17.1	17.6
White.....	55		7	111		3		
Colored.....	55	(*)	13	373	(*)	6	(*)	(*)
Baltimore ⁴	297	19.0	30	102	16.8	18	17.7	15.7
White.....	227		21	91		9		
Colored.....	70	(*)	9	141	(*)	9	(*)	(*)
Birmingham.....	82	15.9	6	60	15.5	4	15.1	14.5
White.....	44		4	69		0		
Colored.....	38	(*)	2	49	(*)	4	(*)	(*)
Boston.....	218	14.5	19	54	16.4	26	17.2	15.9
Bridgeport.....	33	11.7	1	17	14.2	1	13.5	14.3
Buffalo.....	170	15.3	15	61	13.7	12	15.3	14.4
Cambridge.....	26	11.9	1	20	14.2	5	14.5	14.0
Camden.....	44	19.3	8	139	19.3	6	15.8	15.0
Canton.....	31	15.1	0	0	11.4	2	11.3	11.9
Chicago ⁴	746	11.2	79	70	11.8	83	12.2	11.8
Cincinnati.....	142	16.2	4	24	18.9	12	18.0	17.7
Cleveland.....	245	14.0	19	55	11.9	27	12.5	12.4
Columbus.....	91	16.1	4	39	12.5	5	14.9	15.1
Dallas.....	67	12.8	7	-----	7.9	6	12.5	12.8
White.....	48		5			5		
Colored.....	19	(*)	2		(*)	1	(*)	(*)
Dayton.....	56	14.6	0	0	12.4	2	14.1	10.6
Denver.....	94	16.8	9	87	13.4	5	16.1	15.6
Des Moines.....	43	15.5	2	35	15.7	3	12.5	13.8
Detroit.....	305	9.6	41	66	10.9	64	9.7	10.5
Duluth.....	14	7.2	0	0	14.4	3	12.3	11.7

(Footnotes at end of table)

Deaths¹ from all causes in certain large cities of the United States during the week ended March 14, 1931, infant mortality, annual death rate, and comparison with corresponding week of 1930. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)—Continued

City	Week ended Mar. 14, 1931				Corresponding week, 1930		Death rate ² for first 11 weeks	
	Total deaths	Death rate ³	Deaths under 1 year	Infant mortality rate ⁴	Death rate ³	Deaths under 1 year	1931	1930
El Paso.....	27	13.4	5	16.2	2	19.8	18.8	
Erie.....	21	9.8	3	10.8	4	11.2	11.3	
Fall River ⁵	33	14.9	3	11.8	1	13.8	13.9	
Flint.....	32	10.2	7	10.6	5	8.2	10.3	
Fort Worth.....	46	14.8	5	8.9	2	11.7	12.5	
White.....	42		5		2			
Colored.....	4	(*)	0	(*)	0	(*)	(*)	
Grand Rapids.....	41	12.5	1	15	10.8	9.8	11.8	
Houston.....	69	11.6	7	12.9	7	12.2	13.5	
White.....	50		6		5			
Colored.....	19	(*)	1	(*)	2	(*)	(*)	
Indianapolis.....	114	16.1	5	41	14.4	3	15.5	16.5
White.....	91		5	47	2			
Colored.....	23	(*)	0	(*)	1	(*)	(*)	
Jersey City.....	89	14.5	16	142	13.3	6	14.1	12.8
Kansas City, Kans.....	39	16.5	7	144	12.4	3	16.7	12.0
White.....	26		5	123				
Colored.....	13	(*)	2	254	(*)	0	(*)	(*)
Kansas City, Mo.....	135	17.2	9	68	14.7	7	15.7	14.4
Knoxville.....	42	20.1	2	43	13.7	3	14.6	14.8
White.....	38		2	48				
Colored.....	4	(*)	0	0	(*)	0	(*)	(*)
Long Beach.....	27	9.2	2	48	9.4	0	10.6	10.5
Los Angeles.....	299	11.8	19	55	10.4	16	12.2	
Louisville.....	215	36.4	15	129	11.7	2	18.9	14.4
White.....	161		10	98				
Colored.....	54	(*)	5	331	(*)	0	(*)	(*)
Lowell ⁷	31	16.0	6	153	20.7	7	14.9	16.0
Lynn.....	27	13.7	2	52	12.2	2	12.8	12.0
Memphis.....	122	24.6	11	116	20.3	7	18.3	17.8
White.....	62		4	67				
Colored.....	60	(*)	7	203	(*)	6	(*)	(*)
Miami.....	42	19.5	2	51	12.2	2	14.0	13.4
White.....	31		0	0				
Colored.....	11	(*)	2	177	(*)	1	(*)	(*)
Milwaukee.....	127	11.2	17	74	9.3	12	10.7	10.9
Minneapolis.....	102	11.2	19	122	8.7	2	12.4	11.6
Nashville.....	51	17.1	4	60	17.9	6	18.4	16.9
White.....	35		3	60				
Colored.....	16	(*)	1	59	(*)	0	(*)	(*)
New Bedford ⁷	20	9.3	2	53	15.3	4	13.4	12.5
New Haven.....	56	18.0	0	0	15.1	1	13.7	15.2
New Orleans.....	157	17.5	14	77	17.1	9	19.9	19.9
White.....	96		6	50				
Colored.....	61	(*)	8	120	(*)	5		
New York.....	1,680	12.4	140	58	12.6	179	13.8	12.1
Bronx Borough.....	209	8.2	17	39	8.9	22	10.0	8.6
Brooklyn Borough.....	590	11.7	58	61	12.3	71	12.8	11.3
Manhattan Borough.....	667	19.1	46	78	17.7	64	21.0	17.9
Queens Borough.....	168	7.6	14	38	8.2	19	9.1	7.9
Richmond Borough.....	46	14.7	5	90	17.7	6	14.8	15.5
Newark, N. J.....	119	13.9	13	68	12.9	12	14.2	14.4
Oakland.....	66	11.8	2	28	13.0	7	12.3	12.5
Oklahoma City.....	47	12.5	8	110	8.9	3	11.7	10.5
Omaha.....	45	10.8	2	22	12.6	4	15.0	14.5
Paterson.....	47	17.7	1	17	12.4	4	16.0	13.5
Philadelphia.....	568	15.1	64	93	14.4	46	16.8	13.9
Pittsburgh.....	270	20.8	30	104	17.6	27	18.8	15.9
Portland, Oreg.....	71	12.1	1	12	15.8	8	13.0	14.1
Providence.....	60	12.3	7	65	13.2	6	15.7	15.6
Richmond.....	67	19.0	5	73	18.2	1	18.1	17.0
White.....	41		3	66				
Colored.....	26	(*)	2	87	(*)	0	(*)	(*)
Rochester.....	93	14.6	9	82	15.1	6	14.1	13.0
St. Louis.....	258	16.2	18	61	14.5	22	18.6	15.2
St. Paul.....	71	13.4	3	31	9.6	4	11.3	11.4
Salt Lake City ⁷	43	15.7	2	30	9.6	0	12.1	14.0
San Antonio.....	67	14.6	7	18.1		12	15.4	15.4
San Diego.....	32	10.7	2	41	16.4	3	15.9	16.2
San Francisco.....	177	14.2	8	53	14.1	7	15.1	14.4

(Footnotes at end of table.)

April 3, 1931

Deaths¹ from all causes in certain large cities of the United States during the week ended March 14, 1931, infant mortality, annual death rate, and comparison with corresponding week of 1930. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)—Continued

City	Week ended Mar. 14, 1931				Corresponding week, 1930		Death rate ² for first 11 weeks	
	Total deaths	Death rate ³	Deaths under 1 year	Infant mortality rate ⁴	Death rate ³	Deaths under 1 year	1931	1930
Schenectady	16	8.7	3	88	17.4	3	11.6	11.7
Seattle	110	15.4	3	28	14.1	12	13.1	12.0
Somerville	20	9.9	2	74	12.0	3	11.8	12.7
South Bend	12	5.8	0	8.4	2	9.1	10.1	
Spokane	26	11.7	4	104	11.3	2	13.0	13.4
Springfield, Mass.	50	17.1	7	107	19.1	10	14.7	15.0
Syracuse	37	9.1	4	47	13.9	3	13.0	13.4
Tacoma	38	18.4	7	180	13.2	2	15.7	13.1
Toledo	77	13.6	4	37	16.3	5	13.4	14.4
Trenton	44	18.5	3	52	17.7	5	20.1	18.7
Utica	30	15.3	2	52	14.8	6	16.5	15.7
Washington, D. C. White	154	16.3	10	55	15.7	18	18.6	16.1
Colored	101		4	33		10		
Waterbury	63	(*)	6	103	(*)	8	(*)	(*)
Wilmington, Del. ⁵	26	13.4	5	151	15.1	4	11.5	11.8
Worcester	32	15.7	3	65	15.2	3	16.6	16.1
Yonkers	44	11.6	3	41	13.9	3	15.1	15.7
Youngstown	18	6.8	1	26	7.7	2	16.5	9.1
	43	13.0	8	112	9.2	4	11.8	11.0

¹ Deaths of nonresidents are included. Still births are excluded.

² These rates represent annual rates per 1,000 population, as estimated for 1931 and 1930 by the arithmetical method.

³ Deaths under 1 year of age per 1,000 live births. Cities left blank are not in the registration area for births.

⁴ Data for 76 cities.

⁵ Deaths for week ended Friday.

For the cities for which deaths are shown by color, the percentage of colored population in 1920 was as follows: Atlanta, 31; Baltimore, 15; Birmingham, 39; Dallas, 15; Fort Worth, 14; Houston, 25; Indianapolis, 11; Kansas City, Kans., 14; Knoxville, 15; Louisville, 17; Memphis, 38; Miami, 31; Nashville, 30; New Orleans, 26; Richmond, 32; and Washington, D. C., 25.

⁷ Population Apr. 1, 1930; decreased 1920 to 1930; no estimate made.

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PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended March 21, 1931, and March 22, 1930

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 21, 1931, and March 22, 1930

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 21, 1931	Week ended Mar. 22, 1930	Week ended Mar. 21, 1931	Week ended Mar. 22, 1930	Week ended Mar. 21, 1931	Week ended Mar. 22, 1930	Week ended Mar. 21, 1931	Week ended Mar. 22, 1930
New England States:								
Maine	1		51	6	71	31	0	2
New Hampshire		3	2	7	23	29	0	0
Vermont	2				9	18	0	0
Massachusetts	52	68	9	13	500	862	1	7
Rhode Island	6	4	6		8	2	0	0
Connecticut	6	20	17	9	704	16	2	2
Middle Atlantic States:								
New York	124	126	147	140	1,901	961	18	21
New Jersey	52	146	51	15	687	788	5	11
Pennsylvania	101	159			3,503	1,297	8	21
East North Central States:								
Ohio	43	28	55	12	570	720	3	4
Indiana	25	24	34		654	84	7	14
Illinois	106	164	64	44	1,680	662	12	10
Michigan	42	66	79	8	147	995	14	24
Wisconsin	13	14	78	30	314	835	1	4
West North Central States:								
Minnesota	20	14	1	4	112	292	2	3
Iowa	4	6			20	462	2	1
Missouri	29	37	65	9	349	145	15	13
North Dakota		5			11	26	0	1
South Dakota	11	1		2	80	109	0	0
Nebraska	11	12	3		7	504	0	4
Kansas	24	13	34	1	24	557	0	3
South Atlantic States:								
Delaware	3	4	2	1	120	18	0	0
Maryland	11	21	99	36	1,228	19	1	1
District of Columbia	11	18	5		223	1	5	0
West Virginia	14	21	95	22	58	97	1	2
North Carolina	17	33	118	36	698	25	5	2
South Carolina	17	14	1,088	914	127		1	4
Georgia	10	6	630	128	151	221	1	10
Florida	14	7	83	2	289	388	3	0
East South Central States:								
Kentucky					415	217	3	2
Tennessee	4	7	292	95	197	287	1	52
Alabama	13	22	402	171	543	312	18	6
Mississippi	12	10					2	11
West South Central States:								
Arkansas	7	8	285	68	35	17	2	10
Louisiana	19	18	34	27	38	122	5	2
Oklahoma	17	16	120	54	24	435	0	3
Texas	17	34	133	26	71	129	1	4
Mountain States:								
Montana	3	3			8	33	0	3
Idaho	1		2		4	28	0	2
Wyoming		1	3		5	10	0	0
Colorado	5	10			166	347	2	2
New Mexico	4	8	6	1	96	122	2	2
Arizona	1	7	12	8	132	30	5	4
Utah	1	4	15		2	186	2	5
Pacific States:								
Washington	5	3	1		40	269	1	9
Oregon	6	11	204	58	86	52	4	13
California	48	54	430	34	1,378	1,901	4	

¹ New York City only.

² Week ended Friday.

³ Typhus fever, 1931, 1 case in North Carolina.

⁴ Figures for 1931 are exclusive of Oklahoma City and Tulsa.

*Cases of certain communicable diseases reported by telegraph by State health officers
for weeks ended March 21, 1931, and March 22, 1930—Continued*

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 21, 1931	Week ended Mar. 22, 1930	Week ended Mar. 21, 1931	Week ended Mar. 22, 1930	Week ended Mar. 21, 1931	Week ended Mar. 22, 1930	Week ended Mar. 21, 1931	Week ended Mar. 22, 1930
New England States:								
Maine	0	0	43	52	0	0	1	0
New Hampshire	0	0	1	23	0	0	0	0
Vermont	0	0	8	12	0	1	0	0
Massachusetts	0	0	409	269	0	0	3	0
Rhode Island	0	0	49	20	0	0	0	0
Connecticut	0	0	54	139	0	0	0	1
Middle Atlantic States:								
New York	0	1	923	627	1	16	5	18
New Jersey	0	0	313	308	0	0	2	6
Pennsylvania	2	0	555	547	0	3	9	10
East North Central States:								
Ohio	1	0	308	247	46	174	6	4
Indiana	5	0	340	161	112	144	1	0
Illinois	1	0	567	624	39	139	5	6
Michigan	0	2	439	320	20	79	10	4
Wisconsin	1	0	156	170	6	24	0	4
West North Central States:								
Minnesota	0	2	96	142	5	10	0	6
Iowa	1	0	120	90	80	87	1	2
Missouri	0	0	349	114	55	72	3	2
North Dakota	1	0	12	24	4	10	1	3
South Dakota	0	0	25	16	27	41	0	1
Nebraska	0	1	45	87	82	45	2	0
Kansas	3	0	69	135	106	110	0	5
South Atlantic States:								
Delaware	0	0	25	12	0	0	0	3
Maryland ¹	0	0	78	99	0	0	2	7
District of Columbia	0	1	32	26	0	0	1	0
West Virginia	0	0	18	45	11	29	2	11
North Carolina ²	0	0	62	39	0	15	1	1
South Carolina	0	0	10	23	0	0	2	12
Georgia	1	1	110	24	0	0	15	7
Florida	0	0	5	11	0	0	1	0
East South Central States:								
Kentucky	0	0	58	39	14	20	1	2
Tennessee	0	2	37	70	16	10	4	18
Alabama	1	1	29	28	8	2	7	18
Mississippi	0	0	23	13	24	0	3	4
West South Central States:								
Arkansas	0	0	23	11	22	39	4	4
Louisiana	0	0	23	27	24	1	5	15
Oklahoma ³	0	1	40	33	62	86	2	4
Texas	0	0	23	58	54	35	2	0
Mountain States:								
Montana	0	0	20	42	6	9	2	0
Idaho	0	0	7	7	1	11	0	2
Wyoming	0	0	35	2	4	5	0	0
Colorado	0	0	59	20	3	9	0	7
New Mexico	1	0	12	20	4	3	2	0
Arizona	0	0	9	36	9	41	0	1
Utah ³	0	0	16	6	1	0	0	0
Pacific States:								
Washington	0	0	51	61	57	71	2	6
Oregon	1	0	17	44	43	21	2	1
California	1	2	125	182	32	67	6	8

¹ Week ended Friday.

² Typhus fever, 1931, 1 case in North Carolina.

³ Figures for 1931 are exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of monthly State reports is published weekly and covers only those States from which reports are received during the current week:

State	Menin- gooc- cous menin- gitis	Diph- theria	Influ- enza	Malaria	Meas- les	Pel- lagra	Polio- myeli- tis	Scarlet fever	Small- pox	Ty- phoid fever
<i>January, 1931</i>										
Hawaii Territory	8	21	10		86		0	3	0	6
<i>February, 1931</i>										
Idaho	14		19					87	0	20
Illinois	43	533	1,136	2	4,484		6	1,010	228	13
Louisiana	11	174	707	13	14	75	5	100	120	35
Maine	1	18	350		103	1	0	134	0	4
Maryland	4	87	3,417		2,063		1	453	0	12
Michigan	20	163	658		778		3	1,556	142	17
Minnesota	4	55	38		205		8	401	43	10
Missouri	38	181	658	8	3,692		0	1,339	257	13
New York	63	456		5	3,477		7	3,326	38	38
Ohio	19	214	1,575	-1	1,881		21	2,220	239	38
Porto Rico		27	340	2,768	49	5	0		0	17
Rhode Island		40	63		14		0	246	0	4
West Virginia	3	45	706		251		4	87	44	10

January, 1931		Cases	Cases
Hawaii Territory:			
Chicken pox.....	26	Illinois.....	10
Conjunctivitis, follicular.....	53	Illinois (amebic).....	4
Dysentery (amebic).....	1	Louisiana.....	1
Dysentery (bacillary).....	1	New York.....	13
Hookworm disease.....	1	Porto Rico.....	14
Leprosy.....	9	Filariasis:	
Mumps.....	77	Porto Rico.....	3
Ophthalmia neonatorum.....	1	Food poisoning:	
Trachoma.....	1	Ohio.....	4
Tuberculosis, pulmonary.....	75	German measles:	
Tuberculosis, other forms.....	14	Illinois.....	38
February, 1931		Maine.....	6
Chicken pox:		Maryland.....	208
Illinois.....	1,543	New York.....	462
Louisiana.....	65	Ohio.....	39
Maine.....	204	Rhode Island.....	6
Maryland.....	874	Hookworm disease:	
Michigan.....	1,328	Louisiana.....	208
Minnesota.....	639	Impetigo contagiosa:	
Missouri.....	510	Maryland.....	7
New York.....	2,445	Jaundice:	
Ohio.....	2,360	Maryland.....	18
Porto Rico.....	20	Lead poisoning:	
Rhode Island.....	90	Illinois.....	9
West Virginia.....	305	Ohio.....	4
Conjunctivitis:		Leprosy:	
Illinois.....	3	Michigan.....	1
Maine.....	1	Lethargic encephalitis:	
Dengue:		Illinois.....	6
Porto Rico.....	3	Louisiana.....	2
Diarrhea:		Maine.....	1
Maryland.....	5	Michigan.....	7
Diarrhea and enteritis (under 2 years):		Minnesota.....	8
Ohio.....	10	New York.....	15
		Ohio.....	4

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Mumps:	Cases	Tetanus—Continued.	Cases
Illinois.....	1,302	Ohio.....	1
Louisiana.....	9	Porto Rico.....	5
Maine.....	285	Tetanus, infantile:	
Maryland.....	225	Porto Rico.....	15
Michigan.....	573	Trachoma:	
Missouri.....	154	Illinois.....	5
New York.....	1,428	Missouri.....	8
Ohio.....	1,067	Ohio.....	1
Porto Rico.....	2	Porto Rico.....	2
Rhode Island.....	84	Trichinosis:	
Ophthalmia neonatorum:		Illinois.....	3
Illinois.....	4	New York.....	6
Louisiana.....	2	Tularaemia:	
Missouri.....	1	Illinois.....	4
New York.....	3	Louisiana.....	5
Ohio.....	77	Maryland.....	1
Porto Rico.....	7	Minnesota.....	3
Paratyphoid fever:		Missouri.....	3
Maine.....	2	New York.....	2
Minnesota.....	1	Ohio.....	5
New York.....	2	Undulant fever:	
Porto Rico.....	7	Illinois.....	5
Puerperal septicemia:		Louisiana.....	7
New York.....	11	Maine.....	1
Ohio.....	7	Michigan.....	2
Porto Rico.....	14	Minnesota.....	6
Rabies in animals:		Missouri.....	3
Illinois.....	4	New York.....	18
Louisiana.....	17	Ohio.....	13
Maryland.....	2	Vincent's angina:	
Missouri.....	4	Maine.....	5
New York.....	3	Maryland.....	10
Rhode Island.....	1	New York ¹	88
Scabies:		Whooping cough:	
Maryland.....	55	Illinois.....	419
Septic sore throat:		Louisiana.....	24
Illinois.....	8	Maine.....	229
Maryland.....	21	Maryland.....	123
Michigan.....	19	Michigan.....	777
Missouri.....	24	Minnesota.....	216
New York.....	16	Missouri.....	103
Ohio.....	96	New York.....	1,875
Rhode Island.....	3	Ohio.....	421
Tetanus:		Porto Rico.....	175
Illinois.....	1	Rhode Island.....	55
Louisiana.....	1	West Virginia.....	220
Maryland.....	2	Yaws:	
		Porto Rico.....	3

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

The 94 cities reporting cases used in the following table are situated in all parts of the country and have an estimated aggregate population of more than 32,170,000. The estimated population of the 87 cities reporting deaths is more than 30,625,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

¹ Exclusive of New York City.

Weeks ended March 14, 1931, and March 15, 1930

		1931	1930	Estimated expectancy
<i>Cases reported</i>				
Diphtheria:				
46 States	999	1,423		
94 cities	410	604	826	
Measles:				
45 States	17,670	13,297		
94 cities	5,636	3,946		
Meningococcus meningitis:				
46 States	189	247		
94 cities	77	108		
Poliomyelitis:				
46 States	19	19		
Scarlet fever:				
46 States	6,239	5,480		
94 cities	2,318	1,965	1,538	
Smallpox:				
46 States	895	1,551		
94 cities	125	155	60	
Typhoid fever:				
46 States	97	152		
94 cities	19	33	26	
<i>Deaths reported</i>				
Influenza and pneumonia:				
87 cities	1,311	979		
Smallpox:				
87 cities	0	0		

City reports for week ended March 14, 1931

The "estimated expectancy" given for diphtheria, poliomyelitis, scarlet fever, smallpox, and typhoid fever is the result of an attempt to ascertain from previous occurrence the number of cases of the disease under consideration that may be expected to occur during a certain week in the absence of epidemics. It is based on reports to the Public Health Service during the past nine years. It is in most instances the median number of cases reported in the corresponding weeks of the preceding years. When the reports include several epidemics, or when for other reasons the median is unsatisfactory, the epidemic periods are excluded, and the estimated expectancy is the mean number of cases reported for the week during nonepidemic years.

If the reports have not been received for the full nine years, data are used for as many years as possible, but no year earlier than 1922 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviation from the usual trend. For some of the diseases given in the table the available data were not sufficient to make it practicable to compute the estimated expectancy.

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
NEW ENGLAND								
Maine:								
Portland	9	1	2		4	2	18	4
New Hampshire:								
Concord	0	0	1		0	0	0	0
Manchester	0	0	0		1	3	0	1
Vermont:								
Barre	3	0	0		0	0	0	0
Burlington	0	0	1		0	0	0	1
Massachusetts:								
Boston	79	34	17	13	2	105	24	23
Fall River	1	4	1	1	1	0	11	2
Springfield	0	4	2		1	2	1	1
Worcester	6	3	1		0	4	10	4
Rhode Island:								
Pawtucket	10	1	0		0	2	0	4
Providence	20	8	2		4	0	3	5
Connecticut:								
Bridgeport	1	6	0	5	3	0	4	4
Hartford	6	5	7	1	0	36	0	7
New Haven	41	1	0		0	409	18	7

City reports for week ended March 14, 1931—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
MIDDLE ATLANTIC								
New York:								
Buffalo	26	12	7	5	1	288	78	25
New York	374	222	91	42	22	1,032	59	255
Rochester	3	7	0	—	1	2	4	9
Syracuse	17	4	0	—	0	10	0	4
New Jersey:								
Camden	3	6	8	1	0	36	8	11
Newark	118	15	17	12	9	4	15	13
Trenton	3	3	1	13	1	2	3	9
Pennsylvania:								
Philadelphia	155	65	14	14	12	722	59	83
Pittsburgh	114	18	11	13	14	70	47	66
Reading	11	2	1	—	0	129	31	4
EAST NORTH CENTRAL								
Ohio:								
Cincinnati	13	9	2	10	0	91	25	0
Cleveland	—	27	—	—	—	—	—	—
Columbus	17	3	1	5	6	4	2	14
Toledo	50	5	9	7	7	1	35	16
Indiana:								
Fort Wayne	6	3	3	—	0	46	0	4
Indianapolis	68	6	2	—	1	278	19	26
South Bend	1	3	0	—	0	1	0	2
Terre Haute	1	0	0	—	4	1	0	3
Illinois:								
Chicago	100	92	73	14	14	162	59	79
Springfield	—	0	—	—	—	—	—	—
Michigan:								
Detroit	113	46	21	20	7	10	55	40
Flint	16	2	1	53	0	2	9	10
Grand Rapids	5	1	0	1	1	0	1	0
Wisconsin:								
Kenosha	14	0	0	—	0	0	87	0
Madison	40	0	0	—	—	—	54	—
Milwaukee	147	14	8	6	5	83	541	8
Racine	11	1	3	2	1	5	3	1
Superior	16	0	0	—	0	1	0	2
WEST NORTH CENTRAL								
Minnesota:								
Duluth	13	0	0	—	0	0	2	3
Minneapolis	85	14	2	—	6	70	106	13
St. Paul	55	6	0	—	2	4	1	5
Iowa:								
Davenport	0	0	0	—	—	0	0	—
Des Moines	5	1	0	—	—	0	7	—
Sioux City	18	1	0	—	—	9	19	—
Waterloo	3	1	0	—	—	0	0	—
Missouri:								
Kansas City	43	5	6	—	1	90	1	16
St. Joseph	2	1	3	—	0	0	0	2
St. Louis	20	39	15	1	4	130	19	—
North Dakota:								
Fargo	9	0	0	—	1	0	9	0
Grand Forks	2	0	3	—	—	0	2	—
South Dakota:								
Aberdeen	4	0	0	—	—	1	0	—
Sioux Falls	0	1	0	—	—	0	0	—
Nebraska:								
Omaha	31	3	6	—	0	4	18	9
Kansas:								
Topeka	42	2	0	2	3	0	26	0
Wichita	10	2	1	—	0	4	0	6
SOUTH ATLANTIC								
Delaware:								
Wilmington	1	2	1	—	0	18	3	3
Maryland:								
Baltimore	136	23	11	24	8	788	54	66
Cumberland	0	1	0	—	0	0	0	1
Frederick	0	0	0	—	0	4	0	0
District of Columbia:								
Washington	47	12	6	2	0	153	0	15

City reports for week ended March 14, 1931—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
SOUTH ATLANTIC—CON.								
Virginia:								
Lynchburg	28	2	2		0	6	2	1
Norfolk	6	1	0		0	27	8	2
Richmond	3	3	2		2	209	0	7
Roanoke	14	1	0		0	0	0	1
West Virginia:								
Charleston	4	0	0	5	1	0	0	6
Wheeling	18	1	0	2	3	1	0	3
North Carolina:								
Raleigh	21	0	2		0	25	0	1
Wilmington	0	0	0	1	0	3	0	4
Winston-Salem	3	1	0	2	0	8	8	4
South Carolina:								
Charleston	1	0	0	111	2	49	0	12
Columbia	4	0	1		0	0	1	10
Greenville	0	0	0		0	0	0	0
Georgia:								
Atlanta	0	3	0	202	9	32	0	13
Brunswick	0	0	1	6	1	0	26	1
Savannah	4	0	1		1	0	11	6
Florida:								
Miami	5	3	2		1	3	0	0
St. Petersburg		0			0			1
Tampa	4	1	1	2	3	98	1	5
EAST SOUTH CENTRAL								
Kentucky:								
Covington	0	1	0		0	13	0	2
Tennessee:								
Memphis	45	4	2		7	75	3	18
Nashville	2	1	0		3	19	0	6
Alabama:								
Birmingham	4	2	4	53	5	60	1	11
Mobile	2	1	0		1	0	1	1
Montgomery	11	1	0	5		0	1	
WEST SOUTH CENTRAL								
Arkansas:								
Fort Smith	0	0	0			1	0	
Little Rock	2	0	0	2	0	1	9	8
Louisiana:								
New Orleans	10	14	11	2	4	0	0	25
Shreveport	3	0	0		0	0	0	4
Oklahoma:								
Tulsa	10	1	1			5	0	
Texas:								
Dallas		5						
Fort Worth	11	3	4		2	0	0	4
Galveston	0	1	0		0	0	0	3
Houston	6	5	3		1	2	5	7
San Antonio	4	2	2		8	4	0	3
MOUNTAIN								
Montana:								
Billings	4	0	0		0	0	0	0
Great Falls	8	0	0		0	0	0	0
Helena	1	0	0		0	0	0	0
Missoula	0	0	0		0	0	1	0
Idaho:								
Boise	1	0	0		0	0	0	2
Colorado:								
Denver	68	8	2		3	35	34	16
Pueblo		1						
New Mexico:								
Albuquerque	0	0	0	1	0	0	0	0
Arizona:								
Phoenix	3	0	0	1	0	1	0	2
Utah:								
Salt Lake City	7	2	0		0	0	5	3
Nevada:								
Reno	0	1	1	1	0	0	0	1

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City reports for week ended March 14, 1931—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
PACIFIC								
Washington:								
Seattle	36	4	4			3	15	
Spokane	14	2	0			8	0	
Tacoma	0	1	0		4	0	0	4
Oregon:								
Portland	39	7	0	29	2	22	16	10
Salem	1	0	1	2		1	12	
California:								
Los Angeles	95	39	10	146	5	161	11	20
Sacramento	11	1	1	43	2	4	3	17
San Francisco	60	15	4	144	4	6	14	11
NEW ENGLAND								
Division, State, and city	Scarlet fever		Smallpox		Tuber-cu-losis, deaths re-ported	Typhoid fever		
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported		Cases, estimated expectancy	Cases reported	Deaths reported
Maine:								
Portland	4	21	0	0	0	0	0	22
New Hampshire:								
Concord	1	0	0	0	0	0	0	0
Manchester	2	1	0	0	0	0	0	16
Vermont:								
Barre	0	0	0	0	2	0	0	7
Burlington	0	1	0	0	0	0	0	9
Massachusetts:								
Boston	85	136	0	0	9	1	0	34
Fall River	4	6	0	0	3	0	0	3
Springfield	10	7	0	0	1	0	0	2
Worcester	10	22	0	0	3	0	0	8
Rhode Island:								
Pawtucket	1	34	0	0	0	0	0	1
Providence	12	0	0	0	5	0	0	5
Connecticut:								
Bridgeport	12	10	0	0	3	0	0	1
Hartford	7	9	0	0	1	0	0	3
New Haven	10	0	0	0	2	0	0	3
MIDDLE ATLANTIC								
New York:								
Buffalo	29	35	0	0	0	13	1	0
New York	338	480	0	0	0	104	7	1,680
Rochester	10	71	0	0	0	3	0	89
Syracuse	13	17	0	0	0	0	0	37
New Jersey:								
Camden	5	1	0	0	0	1	0	0
Newark	47	53	0	0	0	8	0	26
Trenton	5	13	0	0	0	1	0	44
Pennsylvania:								
Philadelphia	97	155	0	0	0	3	1	35
Pittsburgh	31	45	0	0	0	7	0	13
Reading	4	0	0	0	0	1	0	25
EAST NORTH CENTRAL								
Ohio:								
Cincinnati	22	39	1	0	0	0	0	5
Cleveland	56	0	0	0	1	0	0	
Columbus	11	12	1	0	0	4	2	1
Toledo	14	3	0	1	0	8	1	77

City reports for week ended March 14, 1931—Continued

City reports for week ended March 14, 1931—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuber- culosis, deaths re- ported	Typhoid fever			Whoop- ing cough, cases re- ported	Deaths, all causes
	Cases, esti- mated expect- ancy	Cases re- ported	Cases, esti- mated expect- ancy	Cases re- ported	Deaths re- ported		Cases, esti- mated expect- ancy	Cases re- ported	Deaths re- ported		
SOUTH ATLANTIC—continued											
Georgia:											
Atlanta	5	66	2	0	0	9	1	0	2	1	110
Brunswick	0	0	0	0	0	0	0	0	0	0	5
Savannah	1	1	0	0	0	2	0	2	1	27	29
Florida:											
Miami	1	2	1	0	0	3	0	0	1	0	42
St. Petersburg	0	0	0	0	0	0	0	0	0	0	20
Tampa	0	0	0	0	0	1	1	0	0	0	30
EAST SOUTH CENTRAL											
Kentucky:											
Covington	4	6	0	0	0	1	0	0	0	0	18
Tennessee:											
Memphis	8	70	0	0	0	13	1	3	0	6	122
Nashville	3	6	0	0	0	3	0	0	0	12	51
Alabama:											
Birmingham	3	0	1	0	0	4	0	0	0	7	82
Mobile	0	0	0	0	0	0	0	0	0	2	20
Montgomery	1	0	0	0	0	0	0	0	0	4	-----
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith	0	0	0	0	0	0	0	0	0	0	-----
Little Rock	2	2	0	0	0	3	0	0	0	0	-----
Louisiana:											
New Orleans	8	18	0	11	0	9	2	2	1	0	157
Shreveport	1	0	1	0	0	2	0	0	0	0	26
Oklahoma:											
Tulsa	2	10	2	1	0	0	0	0	0	0	-----
Texas:											
Dallas	6	-----	5	2	0	0	0	0	0	0	-----
Forth Worth	3	3	2	5	0	2	0	0	0	0	46
Galveston	0	0	0	0	0	0	0	0	0	0	17
Houston	2	3	3	7	0	2	0	2	0	0	69
San Antonio	2	1	0	0	0	6	0	0	0	0	67
MOUNTAIN											
Montana:											
Billings	1	0	0	0	0	0	0	0	0	4	1
Great Falls	3	2	0	1	0	0	0	0	0	14	12
Helena	0	0	0	0	0	0	0	0	0	0	5
Missoula	2	0	0	0	0	0	0	0	0	0	4
Idaho:											
Boise	0	1	1	0	0	0	0	0	0	0	8
Colorado:											
Denver	14	30	0	0	0	9	0	0	0	34	94
Pueblo	2	-----	0	0	0	1	-----	-----	-----	-----	-----
New Mexico:											
Albuquerque	0	0	0	0	0	3	0	0	0	0	6
Arizona:											
Phoenix	0	0	0	0	0	0	0	0	0	2	-----
Utah:											
Salt Lake City	4	3	0	1	0	2	0	0	0	36	43
Nevada:											
Reno	0	0	0	0	0	0	0	0	0	0	4
PACIFIC											
Washington:											
Seattle	10	7	2	4	0	0	1	0	0	35	-----
Spokane	7	7	9	11	0	0	0	0	0	0	-----
Tacoma	3	2	3	0	0	1	1	0	0	4	33
Oregon:											
Portland	5	0	15	10	0	1	1	0	0	0	71
Salem	1	0	0	0	0	0	0	0	0	0	-----
California:											
Los Angeles	44	30	3	6	0	29	2	1	0	26	290
Sacramento	3	1	1	0	0	3	1	0	0	35	44
San Francisco	27	2	1	0	0	11	0	1	0	41	180

City reports for week ended March 14, 1931—Continued

Division, State, and city	Meningo- coccus meningitis		Lethargic en- cephalitis		Pellagra		Poliomyelitis (infan- tile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, esti- mated expect- ancy	Cases	Deaths
NEW ENGLAND									
Massachusetts: Boston.....	0	1	0	0	0	0	0	2	0
MIDDLE ATLANTIC									
New York: New York.....	17	9	2	3	0	0	1	0	0
Rochester.....	1	0	0	0	0	0	0	0	0
Syracuse.....	0	0	1	0	0	0	0	0	0
New Jersey: Newark.....	2	1	0	0	0	0	0	0	0
Trenton.....	0	0	0	0	0	0	0	1	0
Pennsylvania: Philadelphia.....	7	6	1	1	0	0	0	0	0
Pittsburgh.....	1	0	1	0	0	0	1	0	0
EAST NORTH CENTRAL									
Ohio: Toledo.....	1	0	0	0	0	0	0	0	0
Indiana: Indianapolis.....	3	3	0	0	0	0	0	0	0
Illinois: Chicago.....	6	4	0	1	0	0	0	0	1
Michigan: Detroit.....	5	2	0	0	0	0	1	0	0
Flint.....	1	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL									
Minnesota: Minneapolis.....	2	0	0	0	0	0	0	0	0
Iowa: Des Moines.....	1	0	0	0	0	0	0	0	0
Missouri: Kansas City.....	0	0	0	0	1	0	0	0	0
St. Joseph.....	1	0	0	0	0	0	0	0	0
St. Louis.....	4	2	0	0	0	0	0	0	0
Nebraska: Omaha.....	2	0	0	0	0	0	0	0	0
SOUTH ATLANTIC									
District of Columbia: Washington.....	4	0	0	0	0	0	0	0	0
Virginia: Lynchburg.....	0	0	0	0	2	0	0	0	0
Richmond.....	0	1	0	0	0	0	0	0	0
North Carolina: Winston-Salem.....	0	1	0	0	1	1	0	0	0
South Carolina: Charleston ¹	0	0	0	0	3	0	0	0	0
Columbia.....	2	0	0	0	0	0	0	0	0
Georgia: Atlanta.....	2	0	0	0	0	0	0	0	0
Savannah.....	0	0	0	0	2	1	0	0	0
EAST SOUTH CENTRAL									
Tennessee: Memphis.....	3	3	0	1	0	0	0	0	0
Alabama: Birmingham.....	5	4	1	0	0	0	0	0	0
Mobile.....	1	0	0	0	0	1	0	0	0
WEST SOUTH CENTRAL									
Arkansas: Little Rock.....	0	0	0	0	0	1	0	0	0
Louisiana: New Orleans.....	1	2	0	0	2	2	0	0	0
Texas: Fort Worth.....	0	0	0	0	0	2	0	0	0

¹Dengue; 2 cases in Charleston, S. C.

City reports for week ended March 14, 1931—Continued

Division, State, and city	Meningo-		Lethargic en-		Pellagra		Poliomyelitis (infa-	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases Deaths
MOUNTAIN								
Utah:								
Salt Lake.....	3	1	0	0	0	0	0	0
PACIFIC								
Washington:								
Seattle.....	2	0	0	0	0	0	0	0
California:								
Los Angeles.....	0	1	0	0	0	0	1	0
Sacramento.....	0	0	1	0	0	0	0	0
San Francisco.....	2	0	1	0	0	0	0	1

The following tables give the rates per 100,000 population for 98 cities for the 5-week period ended March 14, 1931, compared with those for a like period ended March 15, 1930. The population figures used in computing the rates are estimated mid-year populations for 1930 and 1931, respectively, derived from the 1930 census. The 98 cities reporting cases have an estimated aggregate population of more than 33,000,000. The 91 cities reporting deaths have more than 31,500,000 estimated population.

Summary of weekly reports from cities February 8 to March 14, 1931—Annual rates per 100,000 population, compared with rates for the corresponding period of 1930¹

DIPHTHERIA CASE RATES

	Week ended—									
	Feb. 14, 1931	Feb. 15, 1930	Feb. 21, 1931	Feb. 22, 1930	Feb. 28, 1931	Mar. 1, 1930	Mar. 7, 1931	Mar. 8, 1930	Mar. 14, 1931	Mar. 15, 1930
98 cities.....	67	95	68	91	70	104	73	88	166	101
New England.....	75	104	70	100	89	121	106	92	79	92
Middle Atlantic.....	53	78	64	83	56	103	61	85	67	94
East North Central.....	85	114	66	101	78	122	75	94	78	134
West North Central.....	55	107	59	95	55	120	71	118	63	110
South Atlantic.....	59	102	47	120	77	96	93	78	53	104
East South Central.....	52	66	58	96	58	54	29	36	35	24
West South Central.....	118	136	186	80	132	101	118	143	65	111
Mountain.....	78	62	35	70	87	35	61	88	29	26
Pacific.....	49	75	59	53	57	63	63	58	55	63

MEASLES CASE RATES

98 cities.....	521	411	608	446	703	538	769	620	1913	646
New England.....	534	472	541	418	635	506	909	603	1,346	743
Middle Atlantic.....	397	213	652	254	645	346	874	417	1,026	396
East North Central.....	183	231	255	267	300	345	399	442	440	471
West North Central.....	1,314	810	1,086	775	874	639	643	938	595	781
South Atlantic.....	1,817	334	2,202	441	2,800	148	8,238	535	2,753	481
East South Central.....	896	233	1,123	604	1,042	753	1,036	717	1,146	654
West South Central.....	17	663	24	745	24	704	68	505	33	617
Mountain.....	688	758	1,567	767	1,209	1,507	1,332	2,106	1,933	2,440
Pacific.....	168	1,243	243	1,271	223	1,636	347	1,581	356	1,881

¹ The figures given in this table are rates per 100,000 population, annual basis, and not the number of cases reported. Population used are estimates as of July 1, 1931, and 1930, respectively.

² Cleveland, Ohio; Springfield, Ill.; Dallas, Tex.; and Pueblo, Colo., not included.

³ Cleveland, Ohio, and Springfield, Ill., not included.

⁴ Dallas, Tex., not included.

⁵ Pueblo, Colo., not included.

Summary of weekly reports from cities February 8 to March 14, 1931—Annual rates per 100,000 population, compared with rates for the corresponding period of 1930—Continued

SCARLET FEVER CASE RATES

	Week ended—									
	Feb. 14, 1931	Feb. 15, 1930	Feb. 21, 1931	Feb. 22, 1930	Feb. 28, 1931	Mar. 1, 1930	Mar. 7, 1931	Mar. 8, 1930	Mar. 14, 1931	Mar. 15, 1930
98 cities.....	348	302	346	294	373	357	345	321	* 376	337
New England.....	683	382	589	409	606	402	527	431	589	426
Middle Atlantic.....	321	234	342	242	331	308	359	283	389	327
East North Central.....	375	434	353	421	364	510	346	448	* 395	461
West North Central.....	474	331	497	327	509	341	492	345	518	308
South Atlantic.....	320	252	304	236	363	258	354	206	310	210
East South Central.....	378	149	529	149	553	173	401	173	477	96
West South Central.....	105	108	139	94	125	108	71	139	* 99	167
Mountain.....	409	423	296	308	305	388	305	300	* 428	379
Pacific.....	123	269	94	202	145	352	121	241	96	229

SMALLPOX CASE RATES

98 cities.....	18	26	20	24	20	30	13	25	* 20	25
New England.....	0	7	0	0	0	0	0	2	0	0
Middle Atlantic.....	0	0	3	0	0	0	0	0	0	0
East North Central.....	10	33	13	20	11	40	15	24	* 10	30
West North Central.....	84	48	128	93	128	91	57	79	132	70
South Atlantic.....	0	6	2	2	0	2	0	2	0	4
East South Central.....	12	24	17	12	23	6	23	18	0	24
West South Central.....	132	98	51	52	64	111	47	63	* 74	24
Mountain.....	0	35	44	18	9	26	17	9	* 19	9
Pacific.....	29	89	22	101	39	87	12	105	41	115

TYPHOID FEVER CASE RATES

98 cities.....	3	6	4	5	7	8	4	8	* 13	6
New England.....	2	2	0	5	5	0	5	2	0	5
Middle Atlantic.....	2	6	3	6	6	4	3	4	* 2	5
East North Central.....	1	3	0	1	3	1	1	3	* 1	1
West North Central.....	2	10	4	2	11	6	11	8	0	1
South Atlantic.....	0	8	10	14	22	60	12	40	6	24
East South Central.....	29	18	0	6	6	30	17	12	17	42
West South Central.....	14	7	7	3	14	0	0	31	* 16	75
Mountain.....	0	0	9	9	0	0	0	0	* 0	13
Pacific.....	10	4	12	10	4	6	2	6	4	0

INFLUENZA DEATH RATES

91 cities.....	50	20	60	19	50	19	44	16	* 34	13
New England.....	46	5	43	17	24	12	19	19	36	2
Middle Atlantic.....	49	14	42	15	40	16	32	13	23	11
East North Central.....	56	17	61	16	61	16	48	12	* 27	9
West North Central.....	56	12	68	12	74	15	59	3	50	6
South Atlantic.....	118	32	122	22	79	28	73	36	57	18
East South Central.....	63	58	139	71	76	52	139	58	101	84
West South Central.....	159	68	97	68	45	64	52	32	* 55	43
Mountain.....	17	35	61	26	17	18	44	35	* 29	18
Pacific.....	14	17	26	2	41	10	34	2	36	2

PNEUMONIA DEATH RATES

91 cities.....	220	171	217	177	212	193	194	166	* 189	155
New England.....	291	193	276	242	236	232	185	220	147	169
Middle Atlantic.....	254	191	236	190	217	219	229	181	214	178
East North Central.....	182	128	187	151	193	179	160	141	* 130	127
West North Central.....	124	111	147	153	218	138	218	129	159	144
South Atlantic.....	373	214	340	222	312	236	265	222	332	196
East South Central.....	164	220	265	239	271	175	227	214	240	233
West South Central.....	176	256	228	174	221	185	148	160	* 211	142
Mountain.....	183	256	200	247	191	247	131	150	* 209	123
Pacific.....	72	107	70	67	91	62	101	75	125	65

¹ Cleveland, Ohio; Springfield, Ill.; Dallas, Tex.; and Pueblo, Colo., not included.

² Cleveland, Ohio, and Springfield, Ill., not included.

³ Dallas, Tex., not included.

⁴ Pueblo, Colo., not included.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended March 14, 1931.—The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended March 14, 1931, as follows:

Province	Cerebro-spinal fever	Influenza	Smallpox	Typhoid fever
Prince Edward Island ¹				
Nova Scotia.....	1	22		
New Brunswick.....				
Quebec.....	1			
Ontario.....	2	8	2	5
Manitoba.....	1			
Saskatchewan.....			40	3
Alberta.....	1	3		1
British Columbia.....				
Total.....	6	33	42	16

¹ No case of any disease included in the table was reported during the week.

Quebec Province—Communicable diseases—Week ended March 14, 1931.—The Bureau of Health of the Province of Quebec, Canada, reports cases of certain communicable diseases for the week ended March 14, 1931, as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis.....	1	Mumps.....	24
Chicken pox.....	89	Scarlet fever.....	77
Diphtheria.....	35	Tuberculosis.....	74
Erysipelas.....	8	Typhoid fever.....	5
Measles.....	117	Whooping cough.....	29

GREAT BRITAIN

England and Wales—Vital statistics—October—December, 1930.—During the fourth quarter of the year 1930, 154,779 births and 115,698 deaths were registered in England and Wales, giving a birth rate on an annual basis of 15.4 per 1,000 population and a death rate of 11.5 per 1,000. The figures are provisional. The mortality of infants under 1 year of age was 61 per 1,000 live births.

Deaths from certain communicable diseases in 159 smaller towns for the quarter ended December 31, 1930, were as follows:

Disease	Deaths	Disease	Deaths
Diarrhea and enteritis (under 2 years)	92	Scarlet fever	15
Diphtheria	70	Typhoid fever	6
Influenza	173	Whooping cough	35
Measles	54		

During the 14 weeks ended January 3, 1931, deaths from certain communicable diseases were reported in 107 county boroughs and great towns, including Greater London, as follows:

Disease	Number of deaths	Death rate per 1,000 population	Disease	Number of deaths	Death rate per 1,000 population
Diarrhea and enteritis (under 2 years)	849	-----	Scarlet fever	93	.02
Diphtheria	482	0.09	Smallpox	4	-----
Influenza	629	.12	Typhoid fever	27	-----
Measles	472	.09	Whooping cough	171	.03

England and Wales—Communicable diseases—Fourteen weeks ended January 3, 1931.—During the 14 weeks ended January 3, 1931, cases of certain communicable diseases were reported in England and Wales as follows:

Disease	Cases	Disease	Cases
Diphtheria	20,421	Puerperal pyrexia	1,540
Ophthalmia neonatorum	1,324	Scarlet fever	29,310
Pneumonia	12,708	Smallpox	1,550
Puerperal fever	633	Typhoid fever	506

Scotland—Vital statistics—Quarter ended December 31, 1930.—The Registrar General of Scotland has published the following statistics for the fourth quarter of the year 1930:

Population, estimated	4,879,700
Births	23,087
Birth rate per 1,000 population	18.8
Deaths	15,985
Death rate per 1,000 population	13.0
Marriages	8,210
Deaths under 1 year	2,070
Deaths under 1 year per 1,000 births	90
Deaths from—	
Bronchitis	977
Broncho-pneumonia	807
Cerebrospinal meningitis	37
Diabetes	171
Diphtheria	139
Dysentery	6
Erysipelas	42

April 3, 1931

Deaths from—Continued.

Heart disease	2,580
Influenza	127
Lethargic encephalitis	28
Malaria	3
Measles	39
Nephritis (acute)	42
Nephritis (chronic)	422
Paratyphoid fever	6
Pneumonia	656
Poliomyelitis	1
Puerperal sepsis	44
Scarlet fever	29
Syphilis	28
Tetanus	5
Tuberculosis (pulmonary)	728
Tuberculosis (other forms)	244
Typhoid fever	6
Whooping cough	120

JAMAICA

Communicable diseases—Four weeks ended February 28, 1931.—During the four weeks ended February 28, 1931, cases of certain communicable diseases were reported in Kingston, Jamaica, and in the island of Jamaica outside of Kingston as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chicken pox	3	4	Puerperal septicemia		1
Diphtheria		1	Scarlet fever	8	18
Dysentery		2	Tuberculosis	43	63
Erysipels		3	Typhoid fever	13	40
Leprosy	1	1			

Influenza.—According to a report dated February 27, 1931, there was an epidemic of mild influenza on the island of Jamaica. Two hundred cases had been unofficially reported. No deaths had occurred, and the epidemic was not considered serious.

MEXICO

Vera Cruz—Deaths—February, 1931.—During the month of February, 1931, deaths from certain diseases were reported in Vera Cruz, Mexico, as follows:

Disease	Deaths	Disease	Deaths
Bronchitis	3	Pneumonia	6
Cancer	5	Rabies	1
Dysentery	2	Septicemia	3
Gastro-intestinal disorders	21	Syphilis	5
Hookworm disease	3	Tuberculosis	19
Influenza	1	Typhoid fever	3
Malaria	6	All other causes	68
Meningitis	4		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Services, American consuls, International Office of Public Hygiene, Pan American Sanitary Bureau, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths; P, present]

Place	Sept. 21, Oct. 18, Nov. 15, 1930	Oct. 19, Nov. 15, 1930	Nov. 16, Dec. 13, 1930	January, 1931								February, 1931								March, 1931							
				Week ended—				Week ended—				Week ended—				Week ended—				Week ended—							
				20	27	3	10	17	24	31	7	14	21	28	7	14	21	28	7	14	21	28	7	14	21		
China:																											
Canton	C	1	1																								
Shanghai	D	2	2																								
India																											
Bombay	C	18,944	11,112	1,745	3,268	2,779	2,905	3,504	4,022																		
	D	9,782	6,933	918	1,724	1,550	1,497	1,497	2,163																		
	C	38	4	13	7	6	0	0	20																		
	D	17,635	16	19	7	9	6	6	26																		
	C	24	33	22	6	4	5	5	26																		
	D	15	16	16	6	4	1	1	20																		
	C	2	1	1	14	44	70	73	47																		
	D	2	1	1	8	12	19	28	21																		
	C	1	1	1	1	1	1	1	1																		
	D	1	1	1	5	1	1	1	1																		
	C	1	1	1	1	1	1	1	1																		
	D	1	1	1	1	1	1	1	1																		
	C	3	1	1	1	1	1	1	1																		
	D	1	1	1	1	3	9	2	17																		
	C	1	1	4	3	3	1	14	3																		
	D	1	14	4	3	1	1	14	3																		
	C	9	1	2	1	1	1	1	1																		
	D	1	1	3	1	2	1	1	1																		
	C	2	1	2	1	2	1	1	1																		
	D	2	1	1	1	2	1	1	1																		
	C	2	1	1	1	2	1	1	1																		
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	D	2	1	1	1	2	1	1	1																		
	C	2	1	1	1	2	1	1	1																		
	D	2	1	1</																							

April 3, 1931

Place	Au- gust, 1930	Sep- tember, 1930	Octo- ber, 1930	November, 1930			December, 1930			January, 1931			February, 1931		
				1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-31	1-10	11-20	21-31
Indo-China (French) (see also table above):															
Annam	C	3													
Cambodia	C	59	38	22	8	1	17	23							
Cochin-China	C	27	33	28	5	5	3	8							
Hengshuk	D	2	2	4	2	1	2	2	1	1	1	1			

¹ Figures for cholera in the Philippine Islands are subject to correction.

² During the period from Aug. 24 to Sept. 26, 1930, 26 cases of cholera with 17 deaths were reported in Manitum, Surigao Province, P. I.

³ Reports incomplete.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAQUE

[C indicates cases; D, deaths; P, present]

April 3, 1931

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAQUE—Continued

[C indicates cases; D, deaths; P, present]

Place	Week ended—																			
	Sept. 21- Oct. 18, 1930			Oct. 19- Nov. 15, 1930			Nov. 16- Dec. 12, 1930			December, 1930			January, 1931			February, 1931			March, 1931	
Tripolitania.....	C	1		D	13							2	2	1	3		1		1	
Tunisia: Tunis.....	D	1		P	12							1					9	2	3	
Union of Socialist Soviet Republics:				D													7			
Gouraudiz.....																				
Transcaucasia—Karabakh.....	C																			
Union of South Africa:																				
Cape Province.....	C	1		P												P				
Orange Free State.....	C																			
On vessel: S. S. Marlonga de Thermiotis at Avonmouth....	C																			
Place	July 1930	Aug. 1930	Sept. 1930	Oct. 1930	Nov. 1930	Dec. 1930	Place	July 1930	Aug. 1930	Sept. 1930	Oct. 1930	Nov. 1930	Dec. 1930	Place	July 1930	Aug. 1930	Sept. 1930	Oct. 1930	Nov. 1930	Dec. 1930
British East Africa (see also table above):																				
Kenya.....	C	97	87	53	58	62	50	Peru.....						C	8	21	10	42	34	8
Greece (see also table above).....	C	1	2	5	2	5	6	Senegal:						D	1	8	2	20	14	...
Indo-China (see also table above).....	C							Bao I:						C	62	79	48	53	33	4
Madagascar (see also table above):								Dakar I:						D	48	30	23	33	33	4
Ambondro Province.....	C													C	140	168	3			
Antsirabe Province.....	D													D	122	90	8			
Marinarivo Province.....	D	24	11	21	3	18								C	138	76	61	37	10	...
Makamanga Province.....	C	1	2	7	18	12								D	103	33	30	25	3	...
Tunanarive Province.....	D	1	27	18	12	19								C	54	34	12	24	27	2
	D	27	17	29	19	19								D	30	20	4	15	23	1
	C	28	39	70	125	119								C	119	110	20	33	31	2
	D	28	38	70	116	104								D	70	54	14	31	25	1

¹ Reports incomplete.

SMALLPOX

[C indicates cases; D, deaths; P, present]

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALL-POX—Continued

[IC indicates cases; D, deaths; P, present.]

Place	August, 1930			September, 1930			October, 1930			November, 1930			December, 1930			January, 1931			February, 1931		
	Aug.	Sep.	Oct.	Sept.	Oct.	Nov.	Oct.	Nov.	Dec.	Sept.	Oct.	Nov.	Oct.	Nov.	Dec.	Sept.	Oct.	Nov.	Oct.	Nov.	Dec.
Indo-China (see also table above)	C	93	192	258	80	38	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-31	1-10	11-20	21-31	1-10	11-20	1-10
Ivory Coast	C	39	P	4	2	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sudan (French)	C	3	D	17	2	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Syria: Beirut	C	1	-	-	-	16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
British East Africa (see also table above)	C	180	35	424	22	653	Place			Place			Place			Place			Place		
Kenya	C	65	15	3	6	-	Greece	Mexico (see also table above)	Morocco	Turkey	C	1	6	D	659	718	822	B93	4	1	
Chios	C	21	1	-	-	-	-	-	-	-	C	3	8	C	21	19	4	20	1	-	
France	C	-	-	-	-	-	-	-	-	-	C	51	21	D	13	4	2	-	-	-	

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place	Week ended—													March, 1931	
	Aug. 24-Sept. 20, 1930			Sept. 21-Oct. 18, 1930			Oct. 19-Nov. 15, 1930			Nov. 16-Dec. 13, 1930			December, 1930		
	20	27	3	10	17	24	31	7	14	21	28	7	14		
Algeria:															
Algiers	C	3		1	2										
Constantine Department	C	2		1	2										
Oran	C	1		3	6										
Bulgaria:	C	4		3	11	3									
D					1										
China:															
Canton	C														
Manchuria—Harbin (see also table below)	C	2	1		1										
Shanghai	C														
Tientsin	C					1									
Chosen (see table below)															
Czechoslovakia (see table below)															
Egypt:															
Alexandria	C	3	1	2	2										
Bebelra Province:	D	1		2											
D	1				1										
Cairo	C	2		1	1										
Port Said	C	1	1												
Great Britain: Scotland	C														
Glasgow	D														
Guatemala ¹	C														
Iraq: Baghdad	C														
D															
Latvia (see table below)															
Lithuania (see table below)															
Mexico (see also table below):															
Durango	D	1	2												
Mexico City, including municipalities in Federal	C	7	8	11	14	5	2	4	1	13	12	6	8	13	
District	D	2	2	4	7	4	1	3	2	8	9	0	8	7	
San Luis Potosí	C	2		1	2							5	2	2	
Morocco	D	2		3								8	5	6	

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Palestine.....	C	3	3	3	7	1	2	1	16	50	3	43	66	2
Poland.....	C	23	22	37	42	18	6	28	11	21	1	4	3	9
D	1	2	2	7	7	3	1	1	2	1	1	1	1	1
C	4	2	4	6	34	20	31	59	54	43	51	45	2	2
Romania.....	C	14	41	3	3	1	2	1	7	6	2	1	1	1
Spain.....	C	1	2	2	1	1	1	1	1	1	1	1	1	1
Tunisia.....	D	1	2	4	28	1	1	1	7	4	6	6	12	12
Turkey (see table below)	C	6	12	1	1	1	1	1	7	4	6	6	12	12
Union of South Africa:														
Cape Province.....	C	P	P	P	P	P	P	P	P	P	P	P	P	P
Municipality of East London.....	C	P ²	P	P	P	P	P	P	P	P	P	P	P	P
Natal.....	C	P	P	P	P	P	P	P	P	P	P	P	P	P
Orange Free State.....	C	P	P	P	P	P	P	P	P	P	P	P	P	P
Transvaal.....	C	P	P	P	P	P	P	P	P	P	P	P	P	P
Yugoslavia (see table below)	C	P	P	P	P	P	P	P	P	P	P	P	P	P

Place	Aug., 1930	Sept., 1930	Oct., 1930	Nov., 1930	Dec., 1930	Jan., 1931	Place	Aug., 1930	Sept., 1930	Oct., 1930	Nov., 1930	Dec., 1930	Jan., 1931	
China: Harbin (see also table above).....	C	5	1	3	1	1	Lithuania.....	C	7	24	1	5	6	26
Chosen: Seoul.....	C	2	1	7	16	10	Mexico (see also table above).....	D	1	2	1	1	3	3
Czechoslovakia.....	C	1	6	4	4	10	Turkey.....	D	20	47	47	3	2	2
Greece: Athens.....	C	6	4	4	4	10	Yugoslavia.....	C	11	28	28	2	1	2
Latvia.....	C	1	2	1	1	1	D	1	1	1	1	1	2	

YELLOW FEVER

	Cases	Deaths		Cases	Deaths
Brazil:			Brazil—Continued.		
Bahia State—Mar. 14, 1931.....	1	1	Rio de Janeiro State—Continued.		
Ceara State—Mar. 14, 1931.....	2	1	Cambucay—		
Barbalha, Feb. 7, 1931.....	2	1	Jan. 1-25, 1931.....	3	3
Minas Geraes State, Mar. 20, 1931.....	1	1	Feb. 1-7, 1931.....	1	1
Rio do Janeiro State—			Friburgo (imported), Jan. 25-30, 1931.....	1	1
Mar. 7, 1931.....	1	1	Padua—		
Mar. 21, 1931.....	1	1	Jan. 18-24, 1931.....	1	1
			Feb. 1-7, 1931.....	1	1
			Gold Coast: July 10, 1930.....	1	1
			Alfonso, Aug. 4, 1930.....	1	1

X

¹ The Director General of Public Health of Guatemala on February 17, 1931, reported an unusual outbreak of typhus fever in a small village in Guatemala.